THE CULT OF THE COCONUT

GREAT DEVELOPMENT (COPRA) & OIL PALM INDUSTRIES

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THE VAST POSSIBILITIES & WEALTH OF THE TROPICS
PLANTATION PROSPECTS. COST & PROFITS
GREAT FOOD BASIS · NEW DISCOVERIES · ENORMOUS GROWTH IN DEMAND

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ies offer great possibilities for the near future.

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THE COCONUT.

This is an actual photograph of the coconut (reduced in size) as taken from the tree. Encased within the thick shell or outer husk seen above there is a mass of valuable fibre which is used in the manufacture of matting, ropes, etc. Inside this fibre and protected by it is the familiar coconut proper, containing the white flesh which is now in such enormous demand. A matured tree produces from 50 to 400 nuts per annum. Its life is upwards of 75 years.

NOTICE.—This work is also published in French under the title "RICHESSES DES TROPIQUES." Price 2/6 net (3 fcs. 50).

The

Cult of the Coconut.

A popular exposition of the Coconut and Oil-palm industries—containing important, timely, and somewhat exclusive information upon a rapidly increasing trade, and upon the uses of the products and by-products of the Coconut (Copra) and Oil-palm trees.

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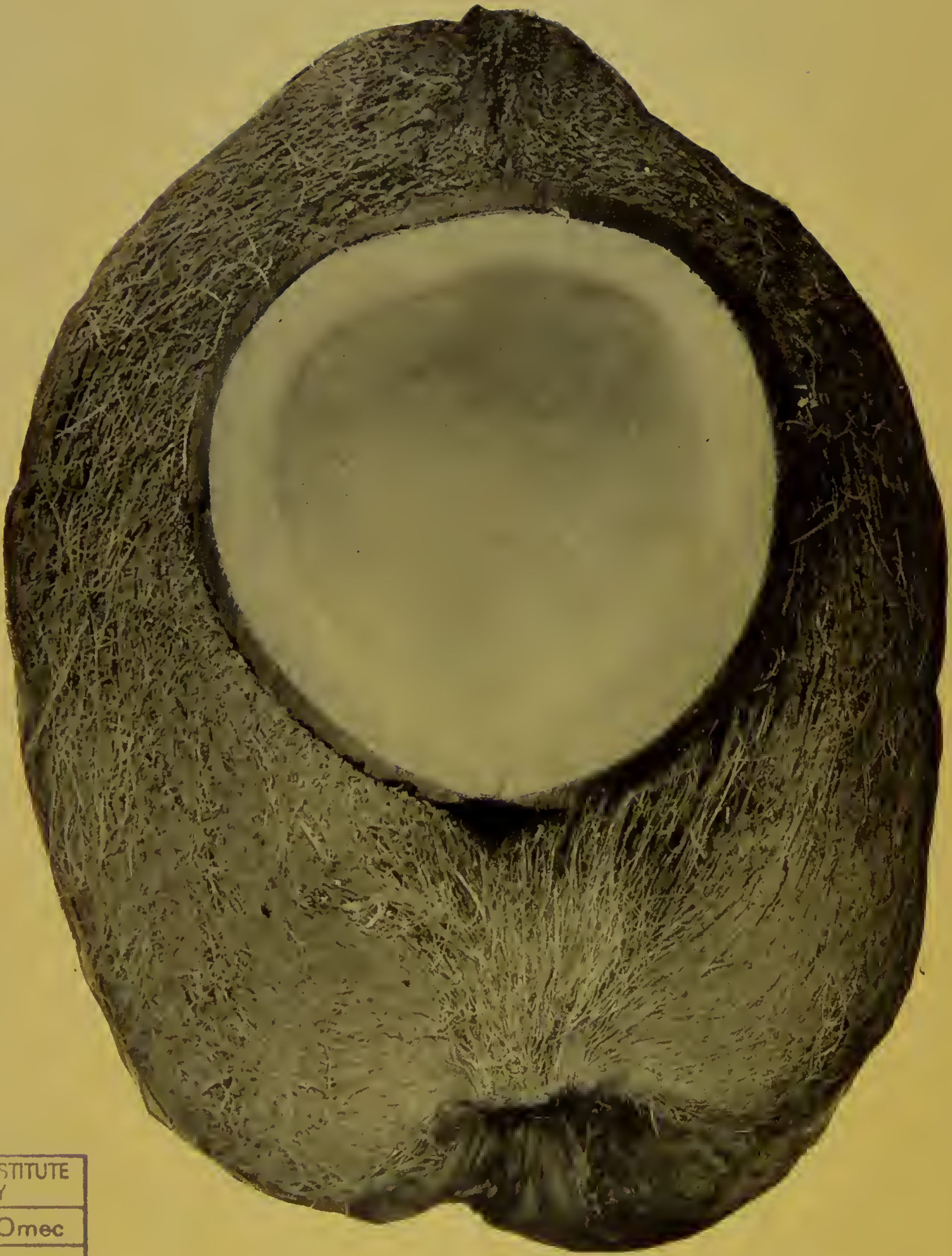

THE COCONUT.

A reduced photograph of the coconut, as collected from the tree and sawn in half.

The outer husk and its fibre are here clearly observable, as also the inner nut and the white flesh of its interior.

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NOTE.—To avoid confusion between cocoa (Theobroma Cacao) and the Coconut (Cocos-nucifera) in future editions the latter will be spelt thus: COCONUT.

FOREWORD.

In the production of the following pages the publishers are actuated by a desire to present in an interesting form, information of an important character regarding the development and possibilities of an industry which is already of enormous proportions, but respecting which comparatively little is generally known.

THE COCONUT TREE.

There is no tree which ministers to the wants of man so munificently as the coconut palm, and the following does not exhaust the list of manifold uses of this wonderful and valuable tree.

1. "The *leaves* for roofing, for mats, for baskets, torches, chules, fuel, brooms, fodder for cattle, and manure.

?? 2. The *stem of the leaf* for fences, for pingoes (or yokes) for carrying burdens on the shoulders, for fish-rods, and innumerable domestic utensils.

3. The *cabbage*, or cluster of unexpanded leaves, for pickles and preserves.

[illegible] Hālk 4. The *sap* for toddy, for distilling, and for making vinegar and sugar.

5. The *unformed nut* for medicine and sweetmeats.

6. The *young nut* for its milk for drinking, and for dessert.

7. The *green husk* for preserves.

8. The *nut* for eating, for curry, for milk, and for cooking.

9. The *oil* for margarine, soap and candles, for rheumatism, for anointing the hair, and for light."

10. The *dried flesh* (copra) for nut butter, margarine and other purposes.

11. The *residue* of the flesh of the nut, after expressing the oil, for cattle food and poultry cake.

12. "The *shell* of the nut for drinking cups, charcoal, tooth powder, spoons, medicine, hookahs, beads, bottles, knife handles" and linoleum.

13. "The *coir* or *fibre*, which envelopes the shell within the husk, for mattresses, cushions, ropes, cables, cordage, canvas, fishing nets, fuel, brushes, oakum, door mats, and floor matting.

14. The *trunk* for rafters, laths, sailing boats, troughs, furniture, firewood, and polished bric-a-brac.

* 15. The *early* shoots of the seedling for vegetable for the table."

16. The *nut* for confectionery, dessicated coconut and many other purposes.

Water of young nut for cleaning [illegible]

* Also the spongy matter in interior of germinated nut.

COPRA.

The dried flesh of the coconut which after treatment produces 59% to 68% of fat and its residue of 31% to 40% is valuable cattle-food cake.

Practically none of the product is lost in treatment.

NATIVE CONSUMPTION.

Coconuts were a staple article of food in many countries long before they were used in large quantities by white men. In Ceylon it has been said that each native consumes at least two coconuts per day, and in that country, as elsewhere, they are chiefly grown by natives, and largely for their own consumption. As regards Ceylon, one authority in 1907 estimated the total value of the trees in the island to be £37,500,000.

SUDDEN INCREASE IN DEMAND.

But this fact is not likely to afford European consumers any consolation, as whatever the price that coconut products rise to—however tempting may be the increase in the already considerable margin of profit—the natives, it must be assumed, cannot do without supplies, and in estimating the world's annual value of coconut production, the native consumption must therefore be included therein; moreover, this native consumption, as it cannot be dispensed with, must be of similar relative value to that coming into the market for the consumption of white men. **The almost sudden and rapid increase in the demand in Europe and America is due to its comparatively recent introduction for edible purposes and to the discovery of its special dietetic and body-building properties and freedom from contamination by microbes such as those of Typhoid and Tuberculosis and superiority over animal products used for this purpose.**

VALUE WORLD'S OUTPUT.

The *Coconut Planters' Manual* for 1907 estimates the world's approximate number of coconuts produced every year at 6,500,000,000 (6,500 millions), the larger portion of which are consumed as food in some form or another, and no industry can rest on a safer, more permanent or mote sure basis than that upon which food supplies rely. In order to estimate the value of this gigantic output, on the basis of copra (4,000 nuts = 1 ton at £28) the annual value would be £45,500,000; and if to this the value of cattle food-cake, fibre, coir and other by-products is added, it would not probably be exaggerating to estimate the value of the present world's annual output as regards the coconut industry alone at over fifty millions sterling.

COMPARISONS.

It must be noted that owing to the industry not being so highly organised as in the case of others—such as, for instance, rubber—estimates of the world's output must, to some extent, be conjectured, but sufficient evidence is procurable for it to be seen that even without a boom the industry is of gigantic proportions. It is of enormous importance, yet little is known regarding it by the British general public, whose knowledge is mostly limited to the familiar costers' shies.

Coconut fat extracted from Copra by a special process for edible purposes.
The illustration on the right is refined fat.

In regard to that portion of the industry which deals with coconut fat (or oil) and coconut cattle food-cake—there is more or less allied to this industry the industry of the oil and cake obtained from another tropical tree, viz., the oil palm. And organised statistics of all the natural and raw products and by-products of the coconut and oil-palm together would probably prove that the world's total output now exceeds a value of £70,000,000 per annum. This is without calculating the enormous increased value of the products when manufactured into various articles, such as margarine, soap, etc.

The following is an estimate, on the basis already alluded to, of the relative importance of the industry to some others:

GOLD. Estimated world's gold output (1910) ...	**£95,784,000**
RUBBER. Estimated world's output of rubber (after a boom and strenuous efforts have been made to place every possible supply on the market at an all-round normal price of 5s. per lb.), 88,000 tons	**49,280,000**
COCONUTS. Estimated world's value of product of coconut palm as explained above (without a boom), over*	**50,000,000**
COCONUT AND OIL PALM. Estimated world's value of product of coconut palm and oil palm combined (without a boom), over ...	**70,000,000**

IMPORTANCE OF INDUSTRY.

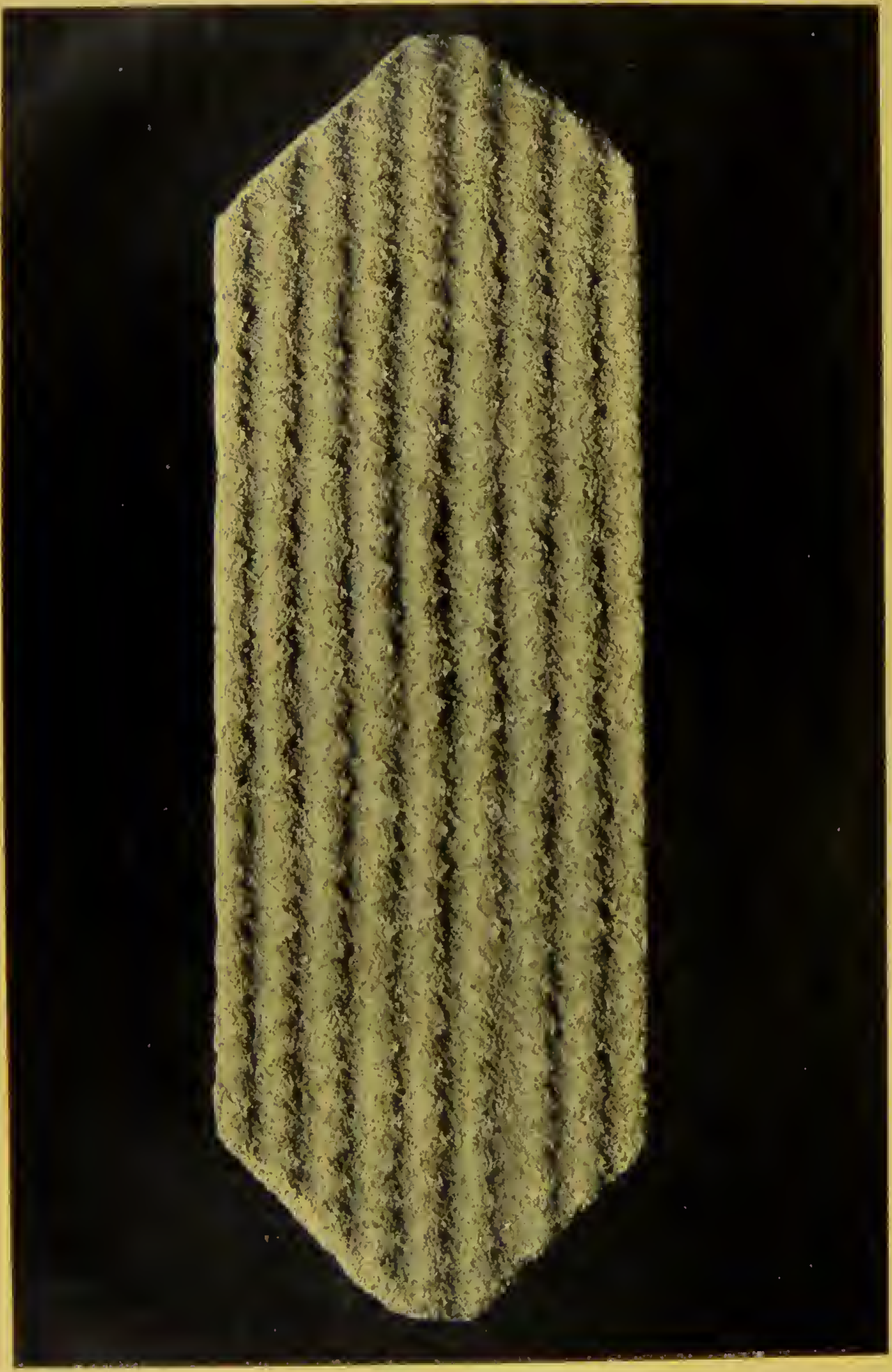
It will thus at once be appreciated that the industry is probably already of far greater importance than that other and now more widely known tropical industry—rubber. Moreover, the coconut and oil-palm industry is now giving a very considerable margin of profit, although in many places it is carried on in a very primitive manner. There are probably few industries which will compare even favourably with these in the considerable margin for profit, and such is the present position and future prospects that it may be conceded that it will be next to impossible for competition to interfere with the present profitable returns obtainable.

FUTURE DEVELOPMENT.

Yet, large as the industry now is, it is on the eve of still greater developments, and it is practically certain that the demand for these products and their consumption will increase year by year, and it is not improbable that at times the supply will be unequal to the demand, which may result in still higher prices.

---

* A correspondent to the Press recently stated that the output of copra only "is never less than 2,000,000 tons yearly," and further remarks: "When it is borne in mind that (taking only a low value at plantation, say £15 per ton) the value of this article alone runs to the stupendous yearly figure of £30,000,000."



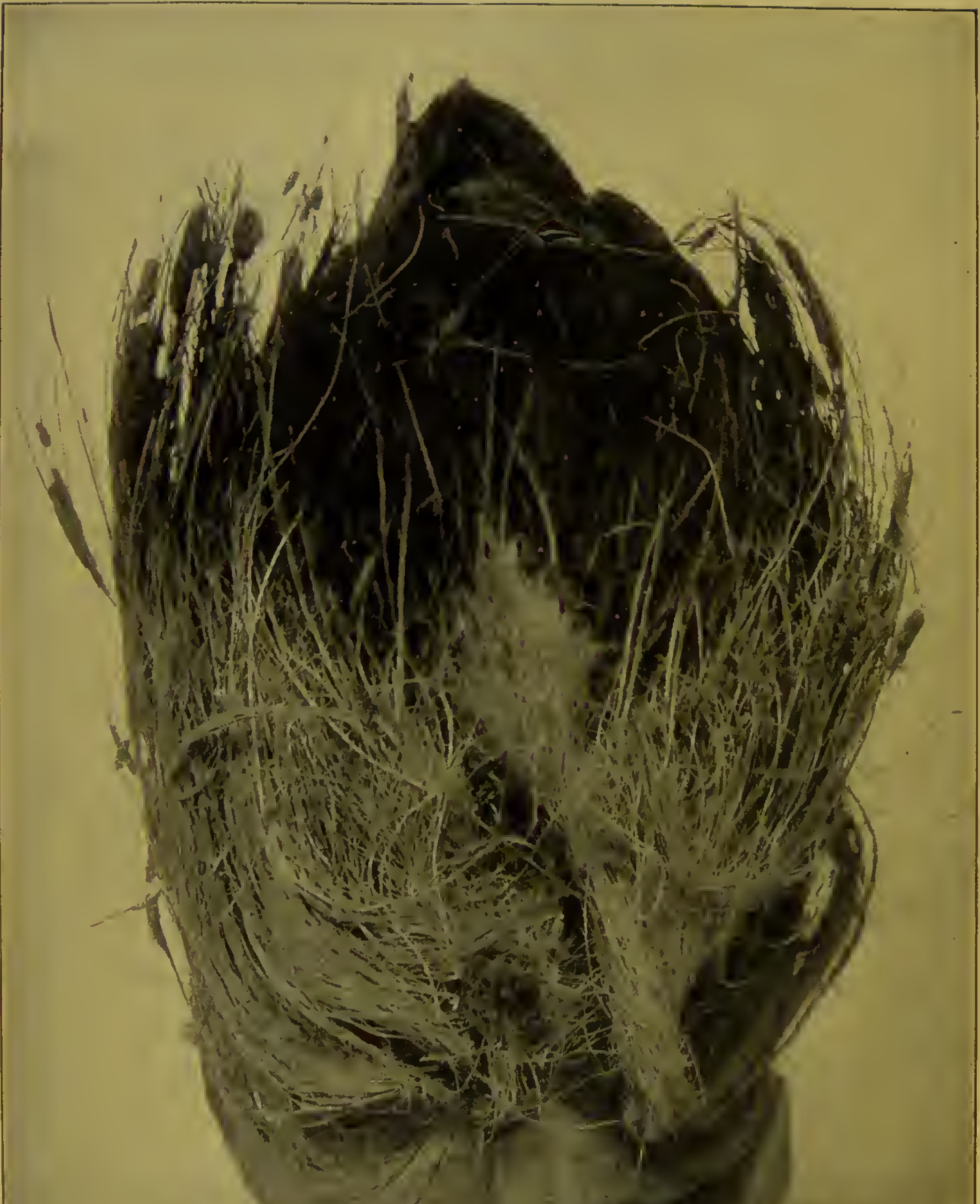
A PIECE OF COCONUT CATTLE-FOOD CAKE.

COMING ACTIVITY.

It is anticipated a demand and interest will set in similar to that which happened in rubber. In fact, it is confidently believed that this will culminate in a boom in coconut estates as soon as the real position and prospects of the industry are more generally known.

REASONS FOR ACTIVITY.

1. Civilisation is progressing to-day at a rate far in excess even of that of ten years ago, and this rate of growth will not slacken in the future; in fact, it will be generally agreed that, if anything, it will quicken.
2. As a result of this progress the world's demand for and consumption of, fats is growing enormously in every direction and these demands are now daily becoming greater and will become greater and greater in the very near future, as civilisation progresses and each country in turn adopts a higher plane of living.
3. Apart from soap and other domestic uses, increased supplies of fat are absolutely necesssary for human consumption.
4. The increased output of *animal* fats, including butter, it is contended in some quarters, cannot grow anything like in proportion to the increased demands—so as to enable an adequate supply to be forthcoming to meet the increased demand for edible and domestic purposes.
5. For many purposes coconut and oil-palm products are superior to those of *animal* fats.
6. The comparatively recent utilisation of coconut fat for the manufacture of (nut butter) margarine, the enormous increase of the popularity and consumption *both here and abroad*, of margarine, which consumption must continue rapidly to increase--the purity, superior dietetic, and body building properties and freedom from contamination by microbes such as those of typhoid and tuberculosis, of coconut fat as now refined for edible purposes compared with butter substitutes which used to be made from mixed *animal fats*—the increasing tendency of the public to recognise that nut butter is a far superior product to the butter substitutes formerly sold as margarine.
7. The enormously increasing consumption of soap containing coconut and oil-palm fat—a similar demand for which is predicted to ultimately arise abroad.
8. The increasing demand for coconut cattle food-cake owing to its superiority over other food-cakes.
9. Apart from the natural increase in demand, a shortage of supplies of *animal fats*, owing to the general drought the world over last summer, will soon be apparent, and this should accentuate the bringing about of special attention to the coconut and oil-palm fat industry.
10. Several houses in the City engaged in financial business, seeing what must come, have been purchasing estates with a view to public capitalisation and issue.
11. The increasing demand for coconut, in the biscuit, confectionery and other trades.



A piece of the outer shell or husk from which the familiar coconut has been removed, showing the mass of valuable fibre from which ropes, matting and other articles are manufactured.

12. The rapid increase in demand and the points mentioned are borne out by the fact that the imports of one country alone (viz., Germany) increased from £4,128,950 in 1908 to £9,272,550 in 1910, and that the partial imports (some figures not being available) of six countries *only*, show the imports of the raw material for making coconut and oil-palm fat increased from £15,839,611 in 1908 to £26,863,150 in 1910, and in these figures are not included the imports of coconuts, fibre, coir, yarn, cattle food-cake, dessicated coconut, etc.

For these reasons it is believed that the future of these industries may not only be described as very bright, but, if the present position and future prospects are carefully reasoned out and based on accurate data, it may be concluded they are on a basis which makes their prospects in the future greater, more permanent and less liable to disturbances and reductions in price *than most other industries.*

A PLANTATION ROAD.

COCONUT CULTIVATION.

COCO-NUT TREES GROWING WITHOUT SPECIAL CULTIVATION.

WEALTH OF THE TROPICS.

In the following pages will be found particulars of a profitable industry which promises to expand into an importance equal, both as regards output and profitableness, to that of other tropical and plantation products:

THE Needs arising out of the growth of civilisation—assisted by science and invention—are doubtless responsible for the migrations and developments of manufactures and of trading energy.

Not only do we enjoy to-day as every-day possessions hundreds of commodities which owe their origin to the necessity of satisfying these Needs, but the discovery of new uses for old commodities has become an almost every-day experience. The constant march of trade is forcing its way into the remotest corners of the world and it is now possible to obtain adequate supplies of tropical products not previously dreamed of as within the range of probability.

Possibilities of new commercial activities are constantly and everywhere arising; consequently those commercial venturers who are better informed of the direction of these possibilities, and who are early in the field, are able to take advantage of their opportunities and secure the benefits of their early information.

INDUSTRIAL REVOLUTION.

During the past decade or so, in England, as in all other civilised countries, the conditions of manufacturing industries and of commerce have been revolutionised, and the acceleration of the rate of economic development of the world are without parallel in any previous period. This change has affected the whole world, creating an entirely new trade between countries, completely altering the character of the trade with the East and developing, with the East, one of incomparably greater magnitude.

THE WORLD'S LAND.

One of the most important economic features of the present time is the fact that the uncultivated land of the world is being comparatively rapidly opened up and utilised. The temperate zones are already more or less filled up, the colder zones are being vigorously attacked, and now increasing attention is being directed to the development and opening up of tropical zones, the commercial importance and natural advantages of which, in the supply of products, are daily becoming more and more apparent.

DORMANT WEALTH OF TROPICS.

The **wealth** of tropical trees, of tropical forests and vegetation—only a small fraction of which is as yet utilised by man—**is incalculable and indisputable.** It may also be said that in many instances, owing to difficulties of accessibility (which are being gradually overcome), the full knowledge of the commercial value and extent of these products has yet to be learnt. The policy of governments in improving means of development by the construction of railways, tramways, roads and telegraphs, is, however, opening up enormous fields, having great possibilities of highly remunerative development.

BASIS OF BRITAIN'S PROSPERITY.

Sir Daniel Morris, K.C.M.G., D.Sc., F.L.S., in a paper read before the Royal Colonial Institute on January 10th, 1911, stated:

"In recent years the production of tropical countries has been in increasing demand, to supply the raw material for the manufacturing industries, on which the prosperity of this country depends. . . ."

RICHEST PORTIONS OF THE TROPICS.

It is admitted that the British are in possession of some of the richest portions of the Tropics, and it is, therefore, a matter of Imperial interest that we should appreciate them at their true value, endeavour to make the best of them and devote time and attention to their development.

Speaking roughly, there are about 3,000,000 square miles (1,920,000,000 acres) of British territory lying within the tropics; the total population is about 300,000,000, while the total value of the exports is estimated at not less than £230,000,000. Our responsibilities in regard to so vast an area can hardly be realised, but if our commercial supremacy depends upon the control of the tropics, we cannot shirk our duty, either in the interests of our possessions or in our own interests.

COCO-NUT PALM, WEST AFRICA.

GERMANY AND THE CONGO.

Owing doubtless to the recognition of the great future value of the products of tropical countries, Governments of non-tropical countries are showing increasing anxiety to obtain control or influence therein.

ENGLISH POLICY.

That which the energy and enterprise of individual Englishmen has won for England, has sometimes been thrown away by the ineptitude of her statesmen and diplomatists. Since the time that the Duke of Newcastle uttered his famous "They tell me Cape Breton is an Island!" English diplomacy has not infrequently been blind to opportunities which have been offered to it, and deaf to the expostulations of those who knew what it was throwing away—Its empire-winners have been disowned or impeached, its pioneers of commerce snubbed.

GERMAN POLICY.

Not so Germany, her policy—and all honour to her for it—is to support the pioneer venturer who bears her flag and to take and keep for the benefit of the Fatherland whatever the adventurous courage of her sons offers for her acceptance. Where the German trade pushes its way there is the German flag to protect it.

Consider what her movements have been during the last few years, and, in the light of the policy she generally follows, draw what conclusions you may.

Germany has lately succeeded in obtaining from France a further large area of tropical Africa, and there are rumours that negotiations are in progress with a view to acquiring additional portions from England. Even Portugal and Spain are to be approached with the aim of securing the reversion of their valuable possessions in tropical Africa. In view of the far-seeing policy of Germany, the question suggests itself to every thinking man. Why is this? Why is it that Germany is so terribly in earnest—even to the brink of war—to acquire land in this tropical region? Clearly, because she has the welfare and prosperity of her traders at heart and is willing to bring all the resources of her Empire to bear in extending those commercial interests which are the foundation of her power. Germany, instead of snubbing her traders, is clear-sighted enough to understand that her position in the comity of nations and her strength depend ultimately upon her trade. The keenest and most far-seeing minds in Germany are working in this direction, and if it is in tropical Africa that Germany is chiefly showing such vital anxiety to extend her territories it is because her statesmen, trained in economics and well posted in the movement of the world's industries, **recognise that Tropical Production from the soil in the near future will be of immense importance to the inhabitants of the European temperate zone.**

COMPLETE KNOWLEDGE.

It must be remembered that the Germans have attacked every branch of commerce, not only strenuously but scientifically. They are no haphazard fighters, but in every movement they have gathered beforehand all the information which could be got, have mastered all the statistics, have weighed and studied all the possibilities and have acted on a matured plan of progress. The minutest details are of importance to them, and are duly fitted into the scheme. Their commercial war is waged in the same way as was the military one of 1870-1, when, the time being ripe, Von Roon, the thinker, produced his plan of campaign, complete to the last baggage wagon, and Von Moltke, the strategist, proceeded to carry it out with exactitude.

The Empire thus founded has been in existence for only 40 years, but it has been carried on in all its branches on similar scientific principles ever since; consequently its commercial progress has been unprecedented and steady—as progress must be when directed in such a manner. It is the scientific plodder we must fear. In commerce England has been the amateur, Germany the professional.

COMPARISONS.

We hear of American competition, of Japanese progress, and it must be admitted they have gone ahead at a marvellous rate; but in the case of Germany it is the manner in which the progress has been made and the sound basis upon which it has been worked that makes it more dangerous to our commercial supremacy than that of all our other rivals.

We have said that Germany acts with deliberation and upon the fullest information. We may assume with certainty that, in seeking to enlarge her foothold in Tropical Africa, she has not departed from her usual principles. What there is to know about the Tropics she undoubtedly knows and knows more thoroughly than any Board of Trade or Chamber of Commerce on this side of the North Sea. In this the Dutch resemble her, but in their case there is lacking the material power to reap the fruit of their exact knowledge.

COMMERCIAL RIVALS.

The time has gone by when England could extend her trade by methods that were successful when she had practically no rivals. We must copy the methods of those who are wresting from us the trade which was once ours without dispute. As an illustration of the need of new methods we may mention that it has been only with the greatest difficulty that we have been able to collect reliable information upon the subject we are treating in this book. Casual reports and imperfect out-of-date information could be had in plenty, but such were of no use for our purpose.

It may be said that our progress in Tropical Agriculture has been large. Perhaps this is true—indeed it may be granted—but that progress has been largely due to favourable circumstances for which we cannot fairly take credit. We have muddled along, but how much greater would have been our progress had we had a more complete and highly organised government department, fully informed on all details, willing and anxious to support, guide and assist our commercial pioneers in all ways possible?

For some months, after tedious translation, we have been carefully studying the reports of German researches and experiments with tropical products, and we have been astonished at the extraordinary detail in which they have been studying the question, the care and patience with which they have carried out observations and the lucid manner in which they have marshalled their facts and laid them before their readers. We can see nothing like it in England. Scientific planters and agriculturists have brought the resources of chemistry to bear upon the subject. They have experimented, have patiently waited the results and have noted them down with the minutest accuracy.

To scientific enquiry like this is due the discovery of the many new uses for the products of the Coco-nut Tree and Oil-palm, and, consequently, the gigantic increase in the trade in these products. The German imports of these have increased from a little over four millions sterling in 1908 to over nine and a quarter millions sterling in 1910!

GERMAN THOUGHTS.

The following translation from a German article on this point will probably be of interest:

> "The share of the [German] Colonial oil products—oil fruit and oil and vegetable fats is very considerable and increases steadily . . . The figures given show that there is the question of quite substantial sums, which are annually spent in Germany to cover the demand for Colonial oil products. At the same time the demand for fat-stuffs increases from year to year, on account of the increase in population, as well as the increasing demand of the industry, which the production of animal fats is not able to cover. . . . It needs no further evidence that it would be in the common interests of our [German] industries, our working class, of our entire political economy to save the great sums which our demand for colonial oil compels us to spend abroad. . . . . There is also the problem to be solved as to how our [German] colonies are to become providers of a greater proportion of the raw material required by our [German] industry. Although the export figures of our [German] Colonies are not important enough to influence the market, they show a satisfactory upward movement. The growth of exports of oil from German Colonies is given as a rise from 19,078 tons in 1899 to 48,495 tons in 1909, which is expected to increase within a reasonable space of time. Particularly the Oil-palm. There are enormous belts of Oil-palm in West Africa, it is said, will be systematically cultivated since it has been proved that it will grow in large districts not only in our [German] African colonies, but also in our territories in the South Sea. Careful enquiries have practically solved the question so important to the exploitation of the plant, of how best to shell and crush the nuts, and express the oil products. . . . Efforts founded on experience continue to be made to improve the machines. . . . In German East Africa endeavour has recently been made to cultivate the Oil-palm systematically. The Colonial Economic Committee supports this cultivation by distributing West African seeds free of cost and has also distributed directions for this cultivation to farmers and natives in the [German] Colonies. . . . ."

FOOD FOR THOUGHT.

Germany wants to expand in the Tropics.

> "M. Cambon said to Herr von Kiderlen-Wächter: Come to the point and say what it is you want. ***One day the German Ambassador in Paris said to me, 'It is in the direction of the Congo that you will find the solution.'*** Herr von Kiderlen-Wächter spoke to M. Cambon in the same sense."—Extracted from *Daily Telegraph.*

BRITISH ANNEXATION.

It behoves England to wake up. Many of our tropical possessions require to be opened up. All are rich in possibilities for pioneer planters and syndicates, but development in many cases is lagging for the want of railways, telegraphs, better means of communication, organised labour and other aids to development.

There are still many tropical islands which might be promptly annexed. As an illustration of the lack of attention of our Home Government of the time which occasioned us loss of valuable tropical territory now annexed by Germany and Holland, the following is extracted from a paper read to the Members of the Royal Colonial Institute by the Hon. J. G. Jenkins, on New Guinea.

> "Few people have any idea of the magnitude of the Island of New Guinea. . . . Next to Australia it is the largest island in the word, containing 312,000 square miles. The Dutch have 151,789 square miles, the British 90,540 square miles and the Germans 70,000 square miles. . . . .
>
> Three attempts were made to annex New Guinea to the British Crown before permission could be obtained from the authorities. In 1793 the whole Island was annexed by officers of the East India Company, but the British Government refused to ratify this Action. In 1873 (eighty years afterwards) Captain Moresby annexed the Eastern part and some of the islands, but his action was disapproved by the Home Authorities. . . Another attempt was made in 1883. . . . The Home Government were again blind to Great Britain's interests and refused the request on the grounds there was no danger from German expansion. To show the blind trustfulness of the Government at the time, and its apparent ignorance of foreign affairs, the very next year Germany took possession of about half the unannexed part of the island. . . . After the Germans had annexed this territory the British Government became partially awake and allowed Australia to protect the unannexed portion of the island. . . . In conclusion I wish to state . . . its development is in its infancy, every indication points to the likelihood of its becoming at no very future date one of Britain's very valuable assets."

A special booklet dealing with Papua, as the British Colony is now named, and its remarkable prospects is now nearing completion (copiously illustrated) and will be published shortly.

RUBBER.

Among the tropical tree juices which have rapidly grown into commercial importance, that of rubber is notorious, and in connection with this it is common knowledge that those who were so fortunate as to possess early information, and who were able to foresee its possibilities, have reaped very considerable profits.

The Rubber industry is not a new one, but has been steadily growing in importance almost ever since the year 1839, when vulcanisation was invented, but it was not until new uses were invented or discovered (bringing with them increasingly greater demand and a rise in prices), that the enormous possibilities attached to this industry became obvious, generally known, and attracted capitalists--which was not unnatural when the enormous profits being made became apparent.

NATIONAL VALUE OF "BOOMS."

It will not here be out of place to refer to the national value of "booms." To these in a measure (and no inconsiderable measure) is responsible the renewal of commercial vigour and power of Great Britain. To these booms, and to the causes which lead up to them, can be largely attributed the ever-increasing size of our national commercial turnover and prosperity; to them can be attributed the remarkable fact that England is immediately recognised as the world's centre and controlling influence of any new great commercial movement or discovery. This is illustrated in the production of gold, in which English booms provided the bulk of capital for the exploitation of the gold mines, not only of British possessions, but also of foreign possessions. To these English booms can be attributed the fact that the world's annual gold supply from new discoveries and methods of mining has (as Mr. Churchill recently stated), increased from 7½ millions sterling per annum in 1850, to the enormous amount of 93½ millions sterling in 1909. Approximately two-thirds of this comes from British possessions, and for the remaining third (obtained from foreign possessions) British capital and energy are doubtless largely responsible. A similar ceaseless energy and willingness of the British to speculate is to be found in comparative tables of the world's commerce and industries, as witness the Rubber boom, which again may be cited as an illustration of the national importance and value of booms. It could probably be shown that British capital controls the world's output of this production, and consequently the greater portion of the world's commerce and profit from the industry.

Prior to the Boom, Rubber Plantations were mostly in the hands of private owners, who readily disposed of them at what they conceived to be favourable prices; but doubtless many of those who sold to shrewd City men (who more fully appreciated the future) on the eve of the boom, much regretted their action when the full force and importance of the future became generally apparent. Leaving out of the question valueless or over-capitalised plantations (the evil of every boom) there is no question but that there was sufficient margin to enable the plantation owner, the financier and also the investor to do well, as may be seen in the enormous percentages now being returned to shareholders; and there are prospects that these percentages, although fluctuating, may yet in many cases considerably increase.

BEST INVESTMENTS.

The soundest foundation for an investment is one which deals in articles of the most universal use—articles which the largest number of people require as matters of daily necessity. If at the same time it can be shown that there is an increasing demand for such articles and, in addition, that they can be supplied at a more profit-bearing rate than heretofore, it may be fairly said that an ideal prospect of good dividends is presented to the Capitalist.

In the following pages we shall proceed to show not only a direction in which these conditions exist, but also to indicate an industry which is leaping to the forefront and in which the immediate and future possibilities are exceptional.

COMPARATIVELY UNKNOWN, RAPIDLY-GROWING, INDUSTRY.

We allude to the products of two other tropical trees—the Coco-nut Palm and the Palm-oil Palm—the assured considerable supplies of which, combined with comparatively new discoveries of the value of their by-products (or expanding markets for them), are now responsible for the growth of a rapidly-growing industry which bids fair to become equal in commercial importance to that of Rubber.

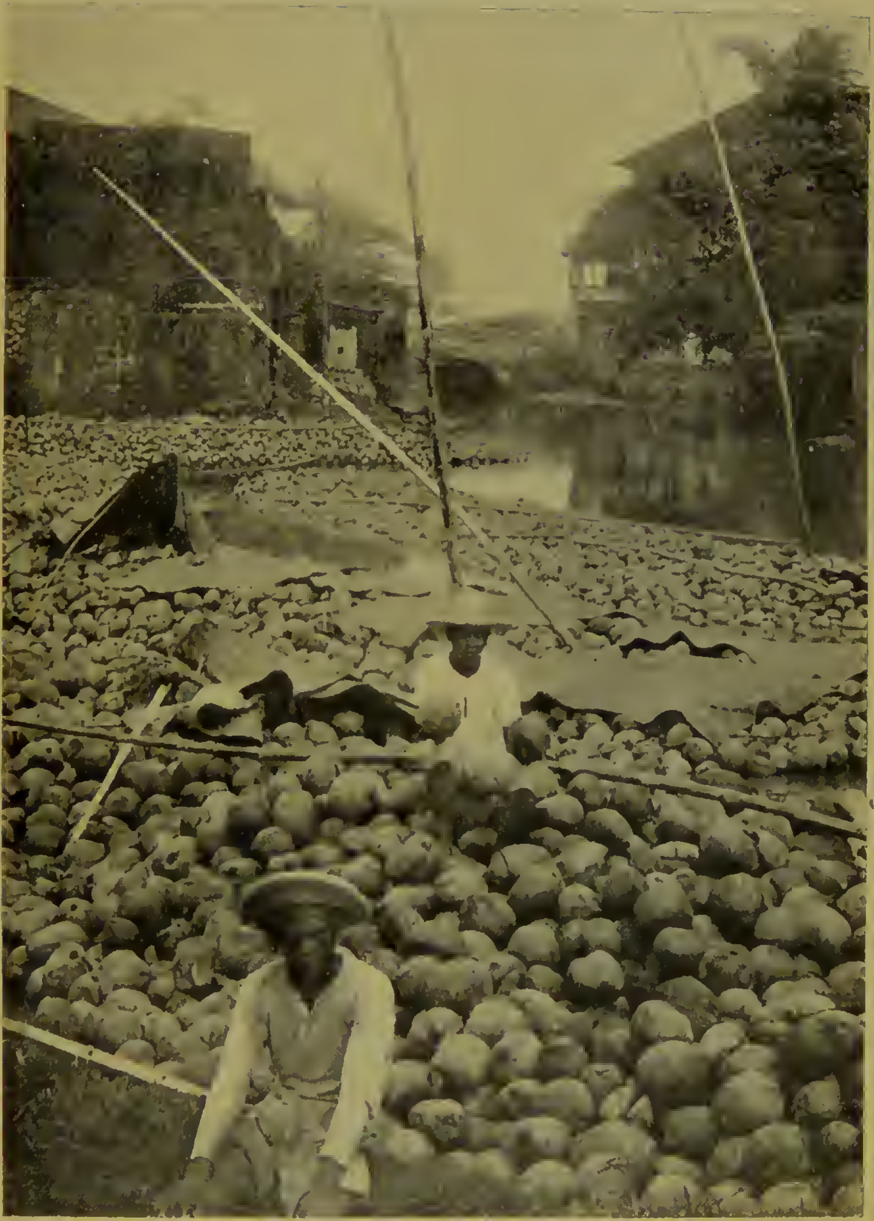
UNUSUALLY REMUNERATIVE DIVIDENDS.

The fact that there are yet other plantation industries, also promising possibilities of unusually remunerative dividends, cannot long remain hidden and is already engaging the attention of City financial houses, but probably the number of persons (outside those engaged in the particular trade) who are really well informed, is as yet comparatively limited. But the dissemination of the necessary knowledge cannot long be delayed and then the full force of its consequence and possibilities should produce a public interest which may, at least in a measure, rival that which occurred in the case of Rubber.

In fact, so quickly does news of such matters circulate, that it would not be matter for surprise were signs of activity to become apparent to the general public, before this work can be circulated.

Most Coco-nut and Palm-oil Tree plantations (as was formerly the case with Rubber) are privately owned, and in many cases the owners (outside of Ceylon, India, and a few other places) are not yet alive to their full commercial value, or have not the means to extend or turn them to the best account. Messrs. Lever Bros., of Port Sunlight fame, are, it is said, spending considerable sums in acquiring and developing plantations on the West Coast of Africa.

There are vast tracts of country in the tropical zone already containing these products, which, for want of organised enterprise and capital, are not yet opened up, and there are also large areas of land specially suitable, both as regards soil and climatic position, for cultivation which should be planted and in which there is scope for the profitable employment of capital judiciously laid out and managed.



Copyright Photo] COCO-NUT FRUIT. [*Underwood & Underwood.*

Rafts specially constructed to carry the fruit of the coco-nut to a convenient place where the thick fibrous husk is separated from the nut. Their proportionate size can be gauged from the two nuts held in the hand of the native.

SOLID BASIS OF INDUSTRY.

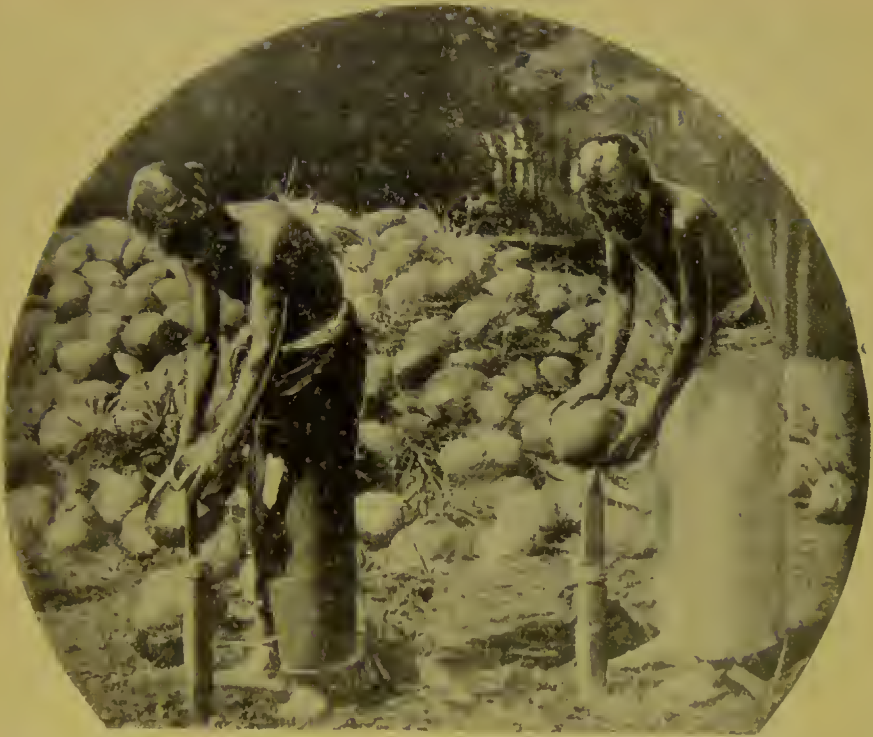
As in the case of Rubber, prior to the great demand caused by new uses, the products of the Coco-nut and Palm-oil Trees have for many years been an important and profitable industry out of which many fortunes have been and are being made. As also in the case of rubber, it has been the discovery of new uses, and consequent rise in price that has attracted the notice of capitalists. In the case of Palm and Coco-nut Oil products there is indeed a combination of causes for the special interest in them, viz.: **Growth of civilisation—unreliability and failure of increase of supply of animal fats in proportion to growing demand,—invention, discovery** of the superior **value and utility of vegetable fats, particularly those produced by the Coco and Palm Tree—and the intrinsic value of nut butter.**

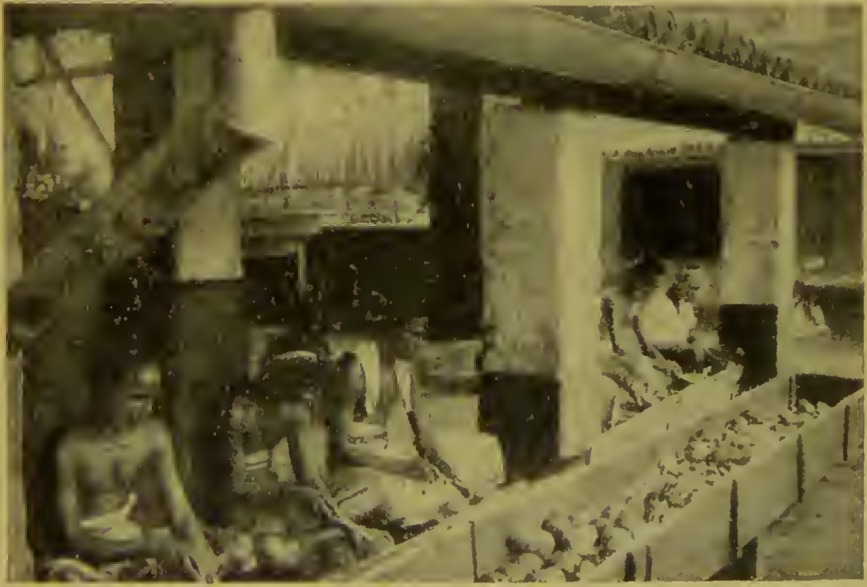
The great future of the industry is daily becoming more appreciated and the increasing requirements of old-established manufactures are responsible for the sound basis upon which it rests, quite apart from the consideration of the huge demands arising out of new uses. "The cost of production is exceedingly low, transport is comparatively cheap," and prices are rising without prospect of any serious set back, as it is unlikely that, even with any widely extensive development, new sources of supply can be produced more quickly than the world's need of vegetable fats is increasing.

In order to make our reference of more general interest, we append a few descriptive remarks upon the trees and the conditions under which they thrive, together with their by-products and their uses, avoiding technicalities as much as possible.

"CONSOLS OF THE EAST."

"Native Ceylonese, who wish to make provision for their old age or to supply a dower for an infant daughter, frequently plant a plot of land with Coco-nuts as the safest and surest means of accomplishing their object. Twenty trees are said to supply sufficient fruit to keep a man comfortably throughout the year, so that a few acres of land fully planted are, in the course of years, a goodly heritage. Some years ago, when Consols (the premier security of the





(1) Breaking Husks. (2) Preparing Nuts for the Copra dry.

world) stood at a much greater price than they do to-day, a prominent Ceylon Administrator, in his official report, likened the establishment of a coco-nut plantation to an investment in Consols, and one frequently hears them referred to as the 'Consols of the East.'"

> "The most precious inheritance of a Singhalese is his ancestral garden of Coco-nuts. . . . . In a case which has been decided in the District Court of Galle . . . the subject in dispute was a claim to the 25th part of ten Coco-nut trees."
>
> Tennant, Ceylon: part VII., chap. ii.

THE COCO-NUT TREE*—COCOS-NUCIFERA.

The Coco-nut, generally mis-called Cocoa-nut, is the fruit of the tropical Palm, botanically known as the Cocos-nucifera and must not be confounded with the ever-green, botanically known as the Theobroma Cacao, whose pod fruit is made into cocoa.

There is probably no single tree, which is better known, so generally useful or more highly prized than the coco-nut palm, which abounds in nearly all tropical countries and in a multiplicity of forms ("almost every part of the tree is capable of being put to economic use") ministers to the requirements of man.

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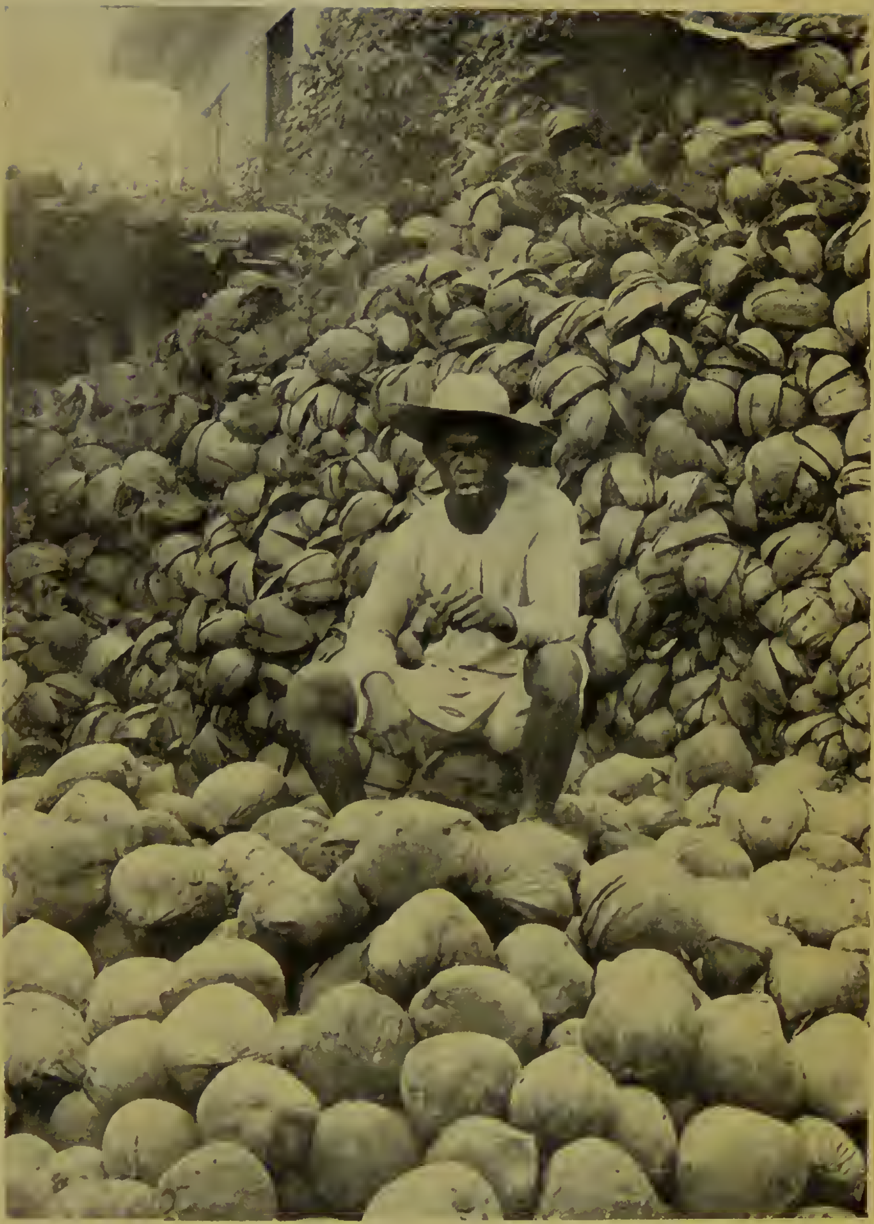
* Another species is said to be known as the Cocos-butyracea, also a specially large species bearing two nuts within one outer husk, is known as the Coco de-mer or Lodiocea Seychillarum, a native of the Seychelles Islands.

PRODUCTS AND BY-PRODUCTS.

Every portion of the Coco-nut has a commercial value, the most important being (1) the thick outer husk which consists entirely of marketable fibre commercially known as COIR and (2) the flesh of the inner nut or kernel, from which Coco-nut oil is expressed in the district where it grows or it is there dried and exported to Europe and other countries under the name of COPRA.

Actual photograph of fruit direct from the tree and split open. Outer husk—coir fibre—inner nut containing white flesh which, sun or kiln dried, is called Copra.



Copyright Photo] COCO-NUT FRUIT. [*Underwood & Underwood.*

Here is clearly seen the fruit of the tree as gathered, and in the background is a pile of the outer covering, almost the whole of which consists of a thick layer of coco-nut fibre, from which coir is made. The familiar interior nuts evidently have been thrown aside as they are not observable in this picture.

COIR

Is practically indestructible, does not harbour vermin, and is free from offensive smell. The thick fibre covering is removed from the nut before the latter is fully ripe, as if allowed to remain it becomes more coarse. It is then soaked, preferably in salt water, for several months (or for a shorter term if tanks of heated water are used), beaten, and after drying in the sun the fibres are again beaten until they fall apart. The spongy matter on or around the fibres is thus separated and comes away in a sort of powder leaving the fibres bare, clean and ready for market. The Coco-nut fibre industry is an important one. It is chiefly used for the manufacture of door and other mats and carpets, brooms and brushes, for press bags used in oil refining, for sacking, for stuffing mattresses, for cheap furniture, for making canvas and for cordage, string and straps. Coir cables are considered the best made, being not only strong, particularly elastic and buoyant, but improving and gaining strength by immersion in sea-water; they have also the peculiarity, it is said, of inclining to curve upwards between the ship and the anchor, while a hempen cable curves downwards. The refuse of the husk is used by horticulturists to cover soil in carpet bedding, as a protector to the bulbs from slugs, to pack between pots of cuttings and for other purposes. The husk in its natural state is also frequently used by the Lascars on the P. and O. steamers, cut up into pieces, as an effective scrubber.

COCO-NUT FRUIT.

Showing fruit as gathered, the outer husk composed of a considerable thickness of fibre or coir and the inner shell or nut, more familiar to us, the white flesh of which is called the kernel and when dried, copra.

The outer husk here depicted consists of a brown or pale straw-coloured skin, under which is a mass of fibrous substance containing numerous reddish-brown, light threads, which, in time, become spongy and is called Coir (also Fibre and sometimes Roya).

The treatment doubtless varies in different districts. Another authority states :

"The quality of fibre depends to a great extent upon its preparation. After the nuts are picked and husked, the fibrous coverings are placed in the mud of near lagoons and there left during the dry season to rot, and until the monsoons come, bringing with them an enormous supply of water which washes the fibre. The greater the quantity of water, the cleaner it washes the fibre."

COIR FIBRE AND COIR YARN.

The major quantity of Coir Fibre and Coir Yarn is at present imported from the Malabar Coast and Ceylon. The West Indies produce a quantity, but very little is exported, as it is principally used on the islands for local requirements. The natives make large quantities of fibre goods and also bags and ropes, but only for their own uses.

COIR MARKET PRICES.

Market prices vary considerably, but the increase or decrease is very gradual. At the time of writing the prices are higher than they have been for the last ten years, which is attributed to the considerable increased consumption, whilst there is only a moderate increase in production. It is said that a further advance in prices may be still anticipated.

COIR FIBRE.	Price Per ton.
COCHIN	£10 to £20 according to quality.
CALICUT	£9 to £15 ,, ,, ,,
CEYLON (known as mattress fibre)	£9 to £12 ,, ,, ,,

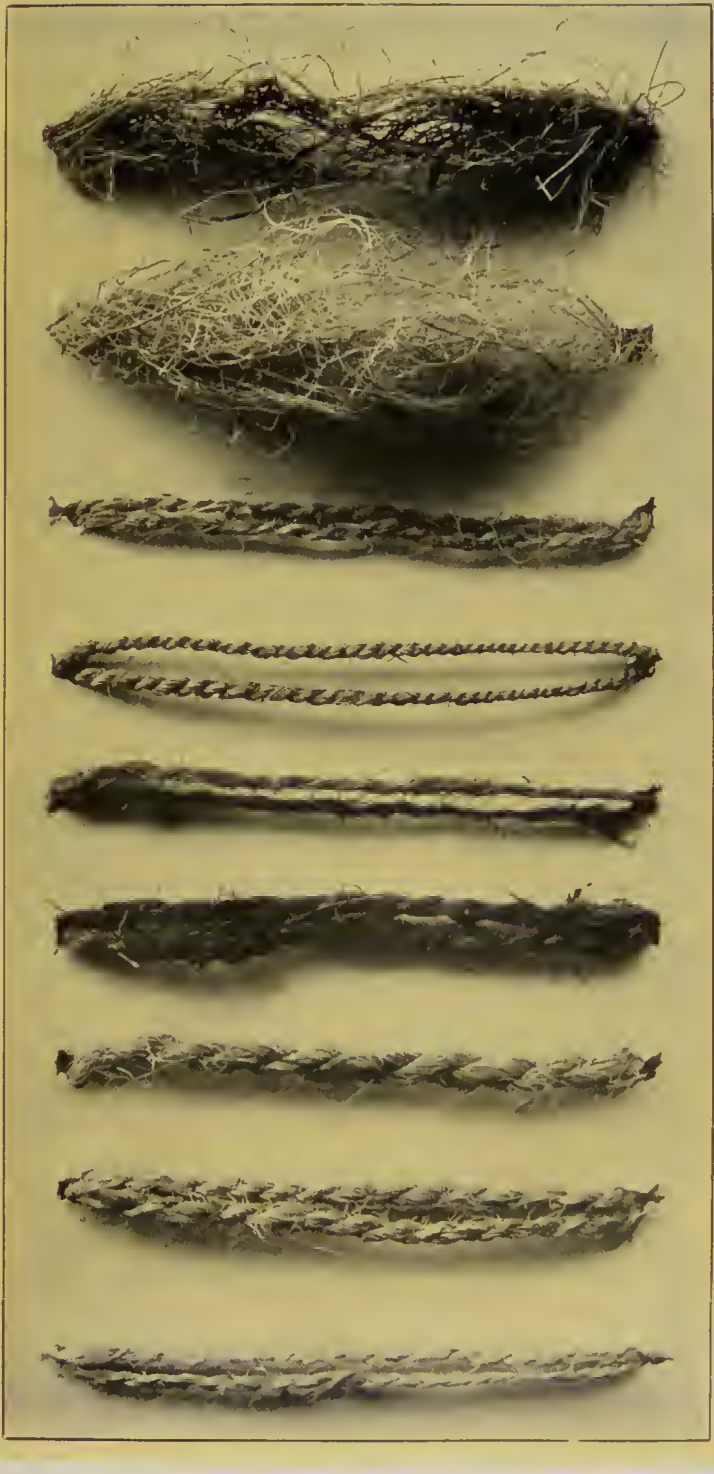
Cochin Fibre is used for the better class familiar fibre door mats, while Ceylon fibre is used for mats of a more common quality and also for stuffing purposes, such as furniture, mattresses, etc.

It may be remarked that the increase in production is not equal to the increased demand.

Other countries which hitherto have only used fibre for their own purposes are now endeavouring to increase their output, to enable them to participate in the continual increasing demand and profitable prices

COCO-NUT FIBRE AND YARNS.

	Approximate Market Value per ton according to Quality.
FIBRES:	
Ceylon	£9—£12
Cochin	£10—£20
COIR YARN:	
Alapat	£32
Anjengo	£20—£30
Mat	£15—£20
Coconada	£7—£18
Roping	£11—£16
Ceylon	£13—£26
Weaving	£17—£25



obtainable. The most important brokers for Coir operating in England and the Continent are Messrs. Bastone and Firminger, of Cullum St., London, E.C.

COIR YARN.

	Price Per ton.
The highest priced Coir Yarn is "Alapat," imported from Cochin	£32 (Weaving Yarn).
ANJENGO—	£20 to £30. (Hard Twisted Yarn).
VYCUM— Cochin	£23 to £25.
COMMON WEAVING YARNS ...	£17 to £25.
MAT YARN	£15 to £20.
SOUTHERN INDIA (Coconada)	£7 to £18.
ROPING YARN	£11 to £16.
CEYLON (mostly used for fine rope-making, weaving and hopping purposes)	£13 to £26.

THE SHELL.

The shell of the nut, found within the husk, is used for fuel and even for tooth-powder and locally, for drinking cups, spoons and lamps; it is also frequently to be seen polished and carved for ornamental purposes. Experiments will probably enable discovery of other uses to be made.

THE KERNEL.

The white flesh of the nut (familiar to all who have patronised the costers' pitches) is commonly called the kernel and contains a very high percentage of fat (about 70 per cent.), which is now largely used in various manufacturing industries and doubtless it is largely due to the expanding markets and increasing demand for this product, that the widening interest in coco-nut properties may be attributed. In the West Indies coolies eat this fat as we use butter and in Europe it is now being put among others to similar use.

COCO-NUT KERNEL.
Showing the familiar flesh of the nut or kernel with the shell removed, which, when broken into pieces or strips, and sun or kiln dried, is called copra.

Coco-nut oil (as this fat is generally termed), appears in this country in the form of a white fat of the consistency of butter or lard. It is extracted, as previously remarked, from the white flesh and possesses the characteristic taste and odour of the coco-nut. The chief varieties of the oil or fat in commerce are: Cochin Oil (the whitest and finest in colour and quality) prepared in Cochin, Malabar; Ceylon Oil, imported from the island of that name, where it is expressed on a large scale; and Copra Oil.

COPRA.

Copra (coprah, or copperah) is the commercial name given to "sun-dried" or "kiln-dried" strips of flesh or kernel, of the coco-nut, previous to the oil fat being extracted and enormous quantities of this product are now being imported to Europe, where the oil is extracted therefrom.

The whole of this dried flesh (Copra imported in sacks) is utilized and there is practically no waste (the waste, due to dust on bagging and shipment, being from ½ % to 1 %). The percentage of fats yielded by Copra depends mainly on the quality of product. That exported from Malabar gives the highest yield and produces the

A Native carrying 200lb. bag of Copra.

Weighing bags of Copra prior to Shipment.

best quality fat. The various percentages of fat produced are approximately as follows:—

Malabar Copra, 68%; Ceylon, 65%; Java, 62%; Singapore, 61%; Australasian. 60%; Manilla, 59%; the residue is manufactured into cattle food cake, so that Copra may be said to yield from 59 % to 68 % of fat and from 31 % to 40 % of cattle food cake. The Malabar Copra is said to require but little refining and has been known to yield as high as 80 % of oil.

Taking bags of Copra to steamer anchored in deeper water. Coco-nut trees can be seen on the foreshore.

4000—5000 full-size Coco-nuts will yield about one ton of Copra, which in its turn yields approximately from 1344 to 1568 lbs. of oil or fat and from 672 to 896 lbs. of residue, used for the manufacture of cattle food cake.

Estimates of the number of nuts required to make 1 ton of Copra vary considerably, which is no doubt due to the size of the nuts and thickness of the flesh varying in different districts. An expert German test states that: 4448 ordinary or mixed nuts, or 3703 selected nuts were required to produce a metric ton (2205 lbs.) of copra.

The oil or fat is obtained by subjecting the dried strips of Copra to cold pressure or by extracting it with the agent of a solvent.

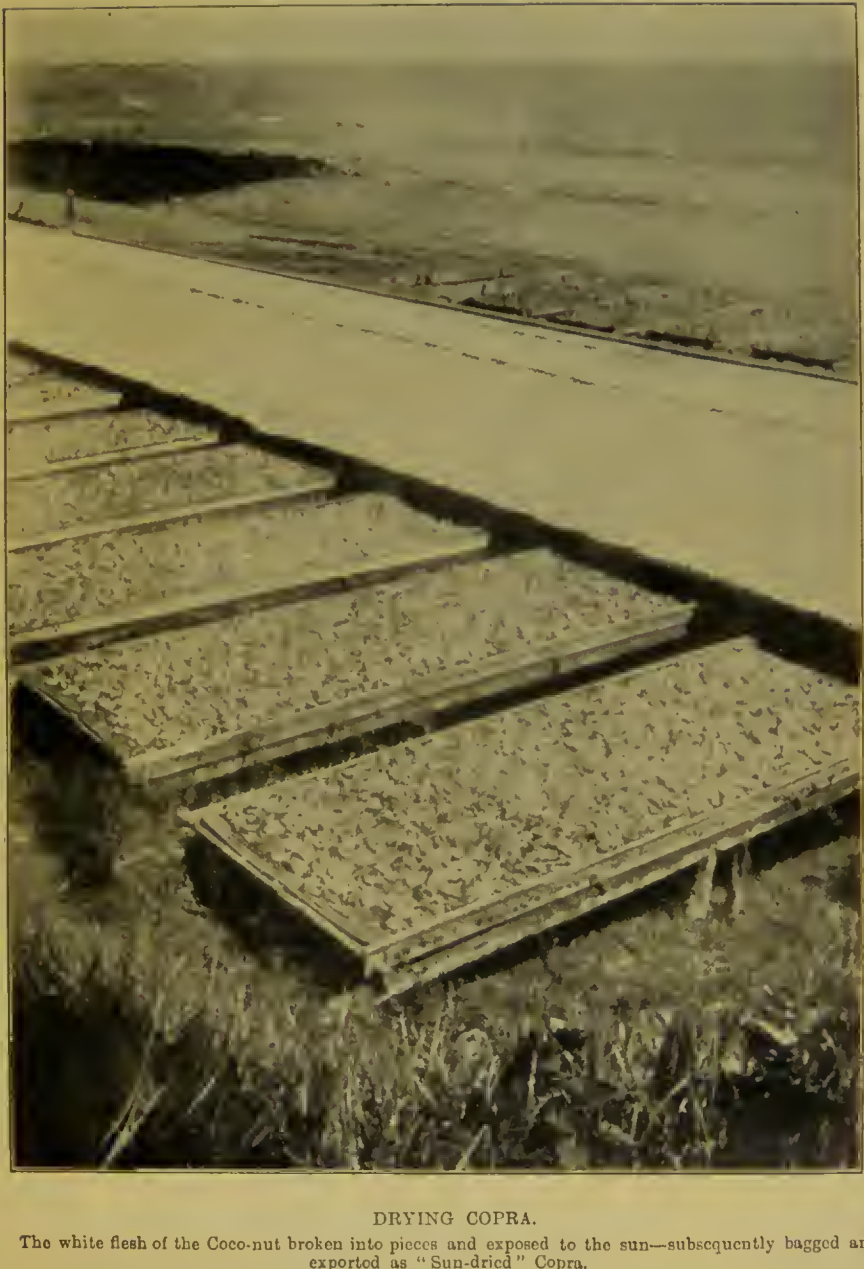
HOW THE OIL IS OBTAINED.

Speaking generally, vegetable oils are expressed by subjecting the cold or warmed material to powerful pressure. Pressure, when warmed, gives the greater yield, but oils obtained from cold pressing ("cold drawn" oils) are of the finest quality and are also of better colour than when heat is applied.

The general principle followed is as follows:

Oil intended for food purposes is cold-pressed, but in that required for technical uses, heat is employed in the extraction.

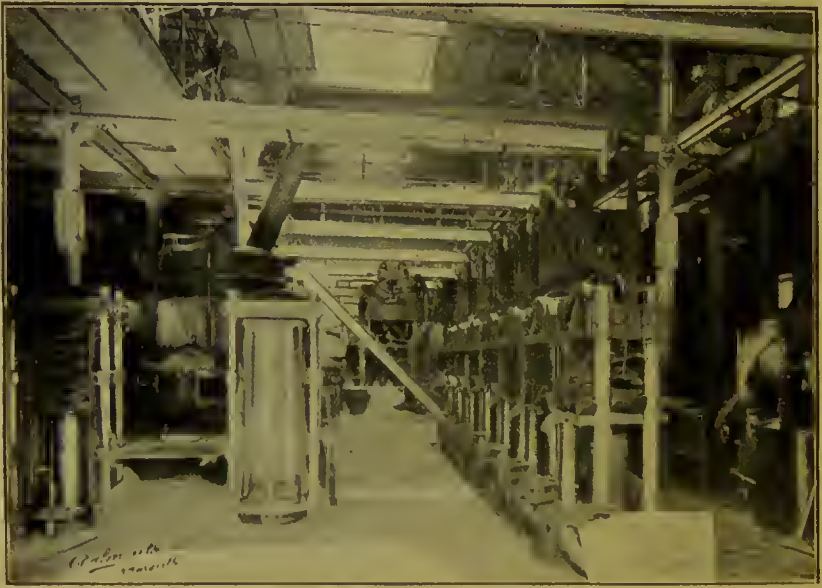
Copra Oil does not command a price quite equal to Coco-nut oil which is expressed on the spot where the nuts are grown and, doubtless, a greater percentage of oil is also extracted when the fruit is treated on the spot with modern appliances instead of being "dried" into



DRYING COPRA.

The white flesh of the Coco-nut broken into pieces and exposed to the sun—subsequently bagged and exported as "Sun-dried" Copra.

Copra; but, on the other hand, European Copra oil expressors require the valuable Copra residue for food cake, for which there is a ready sale and increasing demand in Germany, France, etc.

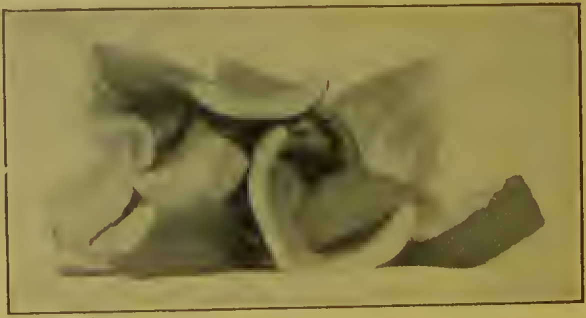


PRESSES FOR EXPRESSING COCO-NUT FAT FROM COPRA.

MARKET PRICES OF COPRA.

The price of Copra has been steadily increasing for several years, although there have been variations due to the "bearing" of stocks and other causes. The market prices of Copra at the time of writing (11th October, 1911) are as follows:

	PER TON.		
	£	s.	d.
Malabar ...	30	0	0
Ceylon ...	29	10	0
Straits (sun dried)	28	5	0
,, (fair merchantable,	27	5	0
Java ...	28	0	0
Macasser ...	27	10	0
Bali and Lombok	27	0	0
Australasian (including South Sea Islands) ...	26	10	0



Actual photograph of Copra—the dried white flesh or kernel of the coco-nut. Part of this pile was from Malabar, and part from the Straits Settlements.

Copyright Photo] THE COCO-NUT TREE. [*Underwood & Underwood.*

Here the coco-nut fruit can be distinctly observed growing on the tree, the heap on the ground being the gathered fruit.

The rise in the value of the product may be gathered from the fact that in 1892 the price of Ceylon Copra C.I.F. was £14 per ton, whilst at the time of writing the London price is £29 10s. 0d.

So considerable is the demand that estates containing groves and land suitable to cultivation, are eagerly being sought out by the few already aware of the position and prospects, and the name, Copra, is likely to become in the near future as familiar to the investing public as those of other plantation industries—Rubber, Tea, Coffee, Cocoa, etc.

MARKET PRICES OF COCO-NUT OIL.*

Cochin Oil	... ...	**per ton**	**£50**	**0**	**0**
Ceylon Oil	... ...	,, ,,	**£46**	**0**	**0**
Copra Oil (Expressed in England)		,, ,,	**£43**	**10**	**0**

*October 12th, 1911.

CONSISTENCY.

Coco-nut oil fat is of somewhat similar consistency to that of butter and possesses the advantage of specific gravity greater than that of most animal fats.

USES OF COCO-NUT OIL.

The oil or fat is extensively used in the manufacture of nut-butter, margarine and other butter substitutes, lard, soap, night-lights and candles, while the purified and deodorised oil is sold under certain fancy names for other purposes.

It is an important ingredient in soap, in that, mixed with other ingredients it produces a free lather.

The fat, when subjected to pressure is divided into two parts, one liquid, the other solid, the latter being known as coco-stearine.

OTHER USES.

In tropical countries, the fat, which in the local method of extraction is not unlike a light coloured butter, is consumed in large quantities as food. The oil is also used for burning and, mixed with a resin, forms a substance for covering seams of boats and ships. In India and Ceylon, it is also used as an ingredient in curry.

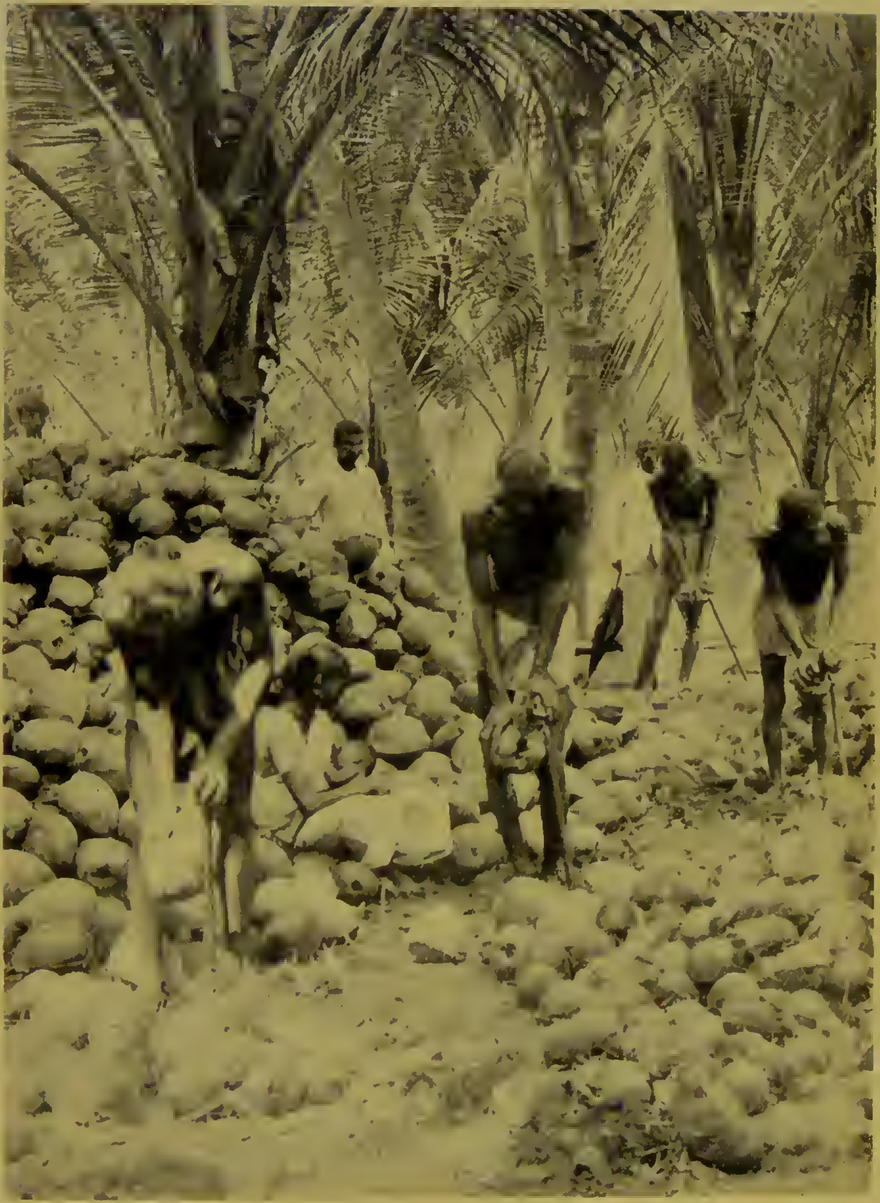
Formerly, its uses in England were mostly confined to the soap and confectionery trades, but its uses have comparatively recently extended to Margarine making (for which it is now in great and increasing demand). It is also used by bakers, restaurateurs, caterers, vegetarian specialists and for lubricating oils, and as a mixture for cosmetics and medicine.

FRESH NUTS.

Considerable quantities of nuts are imported for the purposes of converting into dessicated Coco-nut and, our references would be incomplete did we not mention the familiar coster pitch, where the nuts are vended on the "three shies a penny" system. At the costers' great Whitsuntide market sale, they are classed as "large milky," "middles," "smalls," "milky growers" and "chats," the last-mentioned being the smallest and the thinnest. The London market price for nuts, at the time of writing, is about £4 5s. 0d. per 1000 for Ceylon grown and £3 5s. 0d. for those imported from West Africa and the West Indies.

CATTLE FOOD CAKE.

Farmers are familiar with linseed and other cake for cattle and poultry feeding, but, in England, coco-nut cake is comparatively unknown, and its use for this purpose is mostly confined to Continental Countries. The cake is made from the residue of Copra and experience shows that it (1) produces better milk (2) increases the quantity (3) makes the cream firmer or more solid and (4) makes the butter proportion larger and improves the colour and flavour.



Copyright Photo] [*Underwood & Underwood.*

Natives separating the outer covering of the coco-nut on a plantation. On the left is the fruit as gathered from the tree, and on the right are to be seen the nuts, which are broken at their equator, and the white flesh, when intended for export to Europe, etc., as Copra, is broken into pieces or strips and sun or kiln dried. The outer covering of the nut proper consists of a great thickness of coir or fibre used for manufacturing matting, etc.

There are great possibilities in this direction for some enterprising firms, as Coco-nut cake is exceptionally rich in oil and digestible carbo-hydrates. The following table shows its constituents :

CATTLE FOOD CAKE DIGESTIBLES.

Food.	Fats.	Carbohydrates.	Albuminoids.	Water.
Coco-nut cake	11·2	47·4	18·2	9·4
Palm-nut cake	9·5	55·4	16·1	10·5
Linseed cake	8·9	27·5	24·8	12·2
Sunflower cake	7·6	24·7	31·3	10·3
Rape cake	7·7	23·8	25·3	11·3
Common Cotton cake	5·5	14·9	17·5	11·3

Inquiries show that the English farmer, on the principle of "what was good enough for my father is good enough for me," prefers linseed cattle food cake, although Coco-nut cattle food cake is much cheaper. German farmers (fortunately for our Coco-nut oil refiners) are not so conservative and, after thoroughly investigating and testing the merits of Coco-nut cake, do not seem to have any qualms of conscience about using Coco-nut cake "Made in England," and large quantities are shipped direct from London to Hamburg. Antwerp is also a good market for us.

At an address given by the Government Instructor to the members of the Agricultural Chamber for Schleswig-Holstein, Prof. Conradi made clear that Coco-nut cake was a most reliable food for cows, as it not only increased the fat contents of the milk, but produced butter of a superlative quality. Further, that Coco-nut cake is rich in oil, albuminoids and carbo-hydrates, and had special advantages in that its food nutrients were in an easily-digestible form, so that there is no waste.

Continental farmers readily admit the superior value of Coco-nut cake over that of Linseed, Cotton-seed and other similar cakes. It is said to be the best food for feeding cattle and sheep, rearing young stock and for all milk-producing purposes. An expert gives the following total comparative percentages of the true digestive nutrients, viz : Coco-nut cake, 59·88 %; Linseed cake, 48·71 %; Decorticated Cotton Seed Cake, 42·56 %. "It is thus seen that the aforesaid nutrients found in Coco-nut cake are much in excess of those yielded by the other cakes. This is largely attributable to the fact that the true digestive carbo-hydrates of the Coco-nut cake are much greater in quantity, but apart from such fact, the carbo-hydrates of the Coco-nut cake are of much superior quality and feeding value, inasmuch as they are mostly constituted of sugars, starch and Amylaceous Nutrients, of which the other named cakes are virtually destitute. Coco-nut cake is one of the special cattle foods and its reputed value as a "milk-producer" is to be ascribed, not only to the particular properties of its Fats and its Digestive Proteids, but, as already indicated, very largely to the specific quantity and feeding power of its carbo-hydrates. It naturally follows that Coco-nut cake is a good flesh-making and fattening cattle food.

FEEDING COWS—RESULTS.

"An experiment showed that a cow fed with the usual food yielded 28¾ lbs. of milk per day, which contained 16 ozs. of fat. When fed with 8¾ ozs. of coco-nut cake added to the ordinary food, the animal yielded 35¼ lbs. of milk (an increase of 22·6%) with 19 ozs. of fat (an increase of 18·8%). When the addition of coco-nut cake was increased to 21 ozs., it produced a yield of 35½ lbs. of milk (an increase of 23·5%) with 20¼ ozs. of fat (an increase of 26·5%)."

PRICE OF COCO-NUT CAKE.

The market price of pure coco-nut cake, at the time of writing, is £7 5s. 0d. per ton f.o.b., London, and is still far cheaper than Linseed Cake, although the price has been as low as £5, it is anticipated (when its superiority becomes more generally recognized) that it will be in greater demand, with a corresponding increase in price, until ultimately it is expected to command a higher price than any other cattle food cake. Ceylon manufactures a cake which is known as Poonac; in England Messrs. Loders & Nucoline, of 1, Crutched Friars, London, are not only the largest manufacturers, but also at present the largest consumers, in this country, of Copra. So quickly has the demand increased for the by-products of the coco-nut manufactured by this one firm, that their extensive works have been extended several times and recently their manufacturing capacity has been doubled.

TODDY ARRACK & JAGGERY.

The natives sometimes divert the Coco-nut tree from bearing fruit by cutting off the flower stalks. By making an incision in the stump of a tree so checked from bearing fruit and beating it, they obtain the flow of a juice called Toddy. This is an esteemed beverage, but ferments quickly into very excellent wine (Palm wine), and a very intoxicating liquor is made from it termed Arrack. It also serves as yeast and is extensively used by bakers in Ceylon.

Copyright Photo] [*Underwood & Underwood.*

DRINKING THE MILK OF THE COCO-NUT

A sugar known as Jaggery (resembling maple sugar) is made from Toddy, the unfermented juice being boiled to a syrupy consistency and poured into buckets, where it crystallises.

This Jaggery is a valuable article of food in some districts, it also has a limited use in the manufacture of cement, being mixed with white of eggs and lime from burnt shells. The cement so made is extremely tenacious and when polished resembles white marble.

GUM.

The bark of the tree yields a strong cohesive gum and the ash of the kernel contains about 43 per cent. of potash, 8 per cent. soda, 4 per cent. lime, 9 per cent. magnesia, 13 per cent. chlorine, 16 per cent. phosphoric acid and 5 per cent. sulphuric acid.

COMMERCIAL PROSPECT—RISING PRICES.

During the past few years the products of the coco-nut have been rising in price; and that now commanded leaves the planters a very considerable margin of profit.

There are many reasons for the increased demand and the consequent increase in price. On the Continent especially, in America and in our own Country, nut fat is being used very extensively for many purposes. The large increasing demand for nut butter, or, as it is commonly called, Margarine, has created a demand for coco-nut fats which bids fair to become in excess of the supply. The efforts of several large multiple shop firms to popularise this nutritious article of diet have met with unexpected success. Soap makers, candle makers and oil users have awakened to the fact that vegetable fat is in many ways superior, or at least equal, to animal fat. Indeed, so great is the increasing demand of civilization for fats, that the world is no longer able to provide adequate supplies of animal fat to meet it. The increasing interest and the spreading of information regarding the product, will doubtless result in many another use being discovered.

EXTENDING MARKETS.

> "The Nikko Maru has taken a cargo of 1,000 tons of Copra from Manilla to a new oil refinery at Kobe, Japan, this single shipment exceeding by 100 per cent. the total shipments of Copra to Japan for the past three years. Local Copra dealers think Japanese refiners are experimenting with Copra as a substitute for the soya bean in the manufacture of vegetable oils and fats."
>
> "Oil, Paint and Drug Reporter," 7th Aug., 1911.

Exhaustive enquiries have made it evident that the supply of animal fat, in comparison to increase in requirements, cannot become more plentiful. On the contrary there is every indication of its becoming scarcer. We have in coco-nut fat an efficient substitute which adds to the vast possibilities of the culture of coco-nuts—in itself a very profitable industry.

Formerly Margarine and other butter substitutes were largely composed of neutral lard and oleo produced from animal fats, but vegetable fat is now being largely substituted for the animal fats. The quality of the butter-substitute is said to depend greatly on the care with which the ingredients are amalgamated and the temperature at different stages of the process. The greatest producers of animal fat margarine are the Netherlands.

COCO-NUT TREE—GATHERED FRUIT.

The commercial potentialities of Rubber are thoroughly known—those of the coco-nut have yet to be more widely known and recognised, as they will be on the increasing coco-nut demand. In this event, as in the Rubber movement, it will be the early comers who will reap the reward of their perspicacity.

RECENT GROWTH OF DEMAND.

The rapid growth in the importance of COPRA is mainly due to modern discoveries in methods of refining, whereby the whole of the free fatty acids are eliminated, and this refined and perfected product is found to be superior in many respects to that of animal fats, which it is displacing. In fact, it may be said that these discoveries have created and opened up for the product of the coco-nut, a trade which is developing at an enormous rate and promises to expand so rapidly that the demand may outstrip all possible available supplies; the probable position being in many respects analogous to that recently witnessed in another plantation industry—that of rubber.

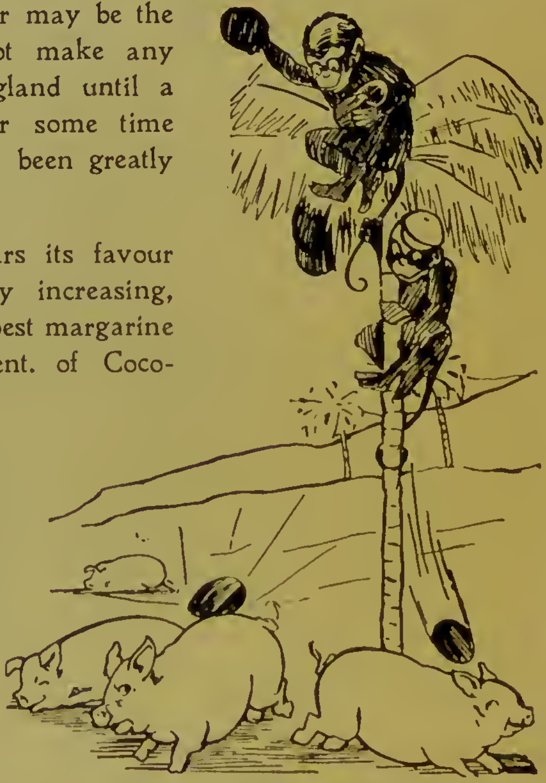
COCO-NUT BUTTER

An English firm is credited with having manufactured coco-nut fat or butter for several years prior to its being taken in hand by a French firm, but the latter claim the honour of first inventing improved processes of refining, whereby the free fatty acids are entirely removed. However, whatever may be the true facts, the product did not make any very great headway in England until a few years ago, although, for some time prior to this, its market had been greatly extending on the Continent.

During the past few years its favour in England has been steadily increasing, until to-day, the bulk of the best margarine vended consists of 80 per cent. of Coco-nut butter.

On turning to old editions — in fact some modern editions — of reference books, mention may be found that vegetable fats are not so easily digested as some animal fats.

It is to be doubted if this were ever the case when properly treated, seeing that it has always been an important food with natives in the East and that Olive Oil has always been largely consumed by the Jews. Such a statement to-day is certainly incorrect as regards the refined product referred to; in fact the contrary is the case. Refiners have succeeded in perfecting the process of eliminating all free fatty acids and it is claimed that Coco-nut butter so refined has digestible properties equal to those of ordinary butter.



An illustration from a familiar advertisement indicating that coco-nut fat is driving away (being substituted for) animal fats.

The demand is not confined to England and France. It is sold in the States and throughout Germany, its uniform price in the latter country being about 8d. per lb., and doubtless its rapidly-increasing popularity will result in the improved methods of its refinement becoming more widely known, and its consumption being increased, by its being adopted in many other countries.

SUPERIORITY OVER OTHER FATS.

In contradiction to the fallacy previously referred to as to digestibility, we are able to produce the following extracts which we have translated from an exhaustive report on the Coco-nut butter as now produced.

Extracts from report of Dr. Challan de Belval, Surgeon 1st class of French Army, member of Society of Hygiene and Medicine and other learned Societies and Officer of the Legion d'Honneur, etc.

1. Coco butter is a production of incomparable purity, thoroughly free from contamination of microbes and from atmospheric ferments.

2. It has the incontestable advantage over all vegetable fats of **very rapid digestibility**, and a thoroughly complete assimilation.

3. Experience proves that by reason of its great richness in soluble fatty bodies and consequently in carbon, it is from the point of view of nourishing power, and as an agent of calorification, the alimentary fat par excellence.

4. It can be kept for a long time without undergoing the least alteration from contact with the atmosphere; it would, consequently, make a very useful food-supply for keeping in reserve.

5. Not only can it render very real service in preparations for the usual food cooking, but further, it is certainly a very valuable agent for restoring ricketty children and those suffering from defective digestion.

METHOD OF MANUFACTURE.

The strips of the dried kernel of the Coco-nut (commercially known, as elsewhere explained, under the name COPRA) are first ground to a meal or pulp and then subjected to great pressure. The oil obtained therefrom then undergoes various refining processes whereby the free fatty acids and impurities are removed, it is then deodorised and the finished product—pure Coco-nut butter—produced, which, if stored in a cool room, will keep from one to two years. The whole process is mechanical, obviating any handling, and, as in the case of all fats produced for edible purposes, it is cold pressed—no heat being applied.

OTHER POINTS FOR CONSIDERATION.

Among the additional interesting features which may be mentioned regarding nut butter as compared with those of animal fats, is the fact that the former can be sterilised, whilst animal fats cannot, the latter being always liable to putrification. Margarine manufactured from animal fats can be detected from the fact that on tasting, it possesses what is described as a "gutty" taste, and in swallowing, its tallowy texture is apparent, whilst nut-butter, or nut margarine (as vendors are obliged under the existing Act to term it), freely melts on the tongue.

The points enumerated in this article, together with the fact that the world's production of edible animal fats is not growing in proportion to the increase in civilisation and consequent higher state of living, are the causes, among others referred to later, for the awakened interest in the COPRA or Coco-nut industry, and the feverish anxiety which is displayed to control plantations of the Coco-nut tree.

DISCOVERY OF SUBSTITUTE FOR BUTTER.

Butter substitutes are said to have derived their origin from the invention of a French chemist named Mège-Mouriès, about the time of the German-Franco War, "and their discovery presents a somewhat curious analogy with that of Beet Sugar. Just as this latter product, which has now so largely ousted Cane Sugar, was discovered by a French chemist at the direct instigation of the first Napoleon, so margarine, which has become in some respects so formidable a competitor of genuine butter, was discovered in the following century by another French chemist at the instance of Napoleon III. The motives of the Emperors, however, were widely different in the two cases. Those of Napoleon I were mainly patriotic, the idea being to render France independent of other countries in the matter of sugar supply: whereas, those of the last Napoleon, were largely humanitarian, the object in view being to obtain a wholesome cheap substitute for butter for the use, more particularly, of the poorer inhabitants of Paris."

As we have followed the discovery of France in the use of butter substitutes, so also, in all probability, it is not unlikely, even at this later day, that in this country an important industry will be ultimately created from the growing of Beet for Sugar, of which we may issue some interesting information in due course.

MARGARINE.

All substitutes for butter, as explained later, are required by law to be sold as margarine. Yet there is quite a distinction between what, for the purposes of explanation, we have called nut butter—sold here as nut margarine—and inferior margarine.

The original French product was made almost wholly from best beef suet. "In 1885 it was calculated that 150,000 heads of cattle would yield only 3000 tons of 'Butterine' by the original Mège-Mouriès process . . . the lack of material led to the gradual abandonment of the original method of production." In the course of time various experiments were made and many processes introduced and subsequently, owing to the variety of makes containing desirable or undesirable mixtures both of vegetable and animal fats and doubtless all kinds of greases, special legislation was determined upon, resulting in the

MARGARINE ACT, 1887,

but when this Act was passed, what we have already alluded to as nut butter was for commercial purposes (at any rate in its present highly perfected state), unknown, and whilst the public prejudice against margarine is being gradually overcome and an enormous demand is springing up for nut margarine, the industry labours under restrictions which should be modified.

The margarine sold to-day, and we allude particularly to that largely containing nut fats, is not that which was sold when the Act of 1887 was passed, but in spite of this disability, a considerable section of the public now recognises (as evidenced by the demand) that nut margarine—as, for illustration, that vended by Maypole, Pearks and other well-known firms—is a superior product, possessing desirable and highly nutritious qualities.

The Margarine Act in effect states that anything except butter (made exclusively from milk or cream), shall be sold as margarine, whether it contains milk butter or not, and every package, whether opened or closed, "shall be branded or durably marked 'Margarine' on the top, bottom and sides in printed capital letters not less than three-quarters of an inch square . . . and shall in every case deliver the same to the purchaser in a paper wrapper, on which shall be printed in capital letters, not less than a quarter of an inch square, 'Margarine.'"

"NUT MARGARINE

MADE FROM NUTS AND MILK.
It looks and tastes like FINEST BUTTER."

THE CONVERSION.

By an Act of 1899 the latter letters were increased to half-an-inch, and the provision of the 1887 Act extended to cheese (other than that made exclusively from milk or cream).

With the rising commercial importance and growing trade in nut butter, steps should be taken to modify the Act of 1887 to meet the requirements of a rapidly-growing industry, and at least to distinguish the product mainly consisting of coco-nut butter, from that of inferior margarine made from common animal greases and American cotton-seed oil. The growing section of the **public, who object to** the consumption of the less nutritious and digestible **animal products in any form**, also requires to be considered, both by those framing Acts and by the manufacturers. And, from this view also, a distinction is required between butter substitutes manufactured from animal fat, those manufactured entirely from vegetable fats, and those containing a varied mixture. It can be said with safety, that, large as is the public now utilising butter substitutes made mainly from vegetable fats, there must always remain the most considerable percentage of the public who are prejudiced and who will not buy it, when labeled margarine, but who, when they understand the superiority of nut butter over other butter substitutes, will purchase it, provided it is clearly distinguished therefrom. Those, therefore, interested in the trade, should push forward the modification of the Acts of 1887 and 1899 and adapt their methods of manufacture to meet modern requirements and the increasing taste of a section of the public for wholesome and nutritious nut-butter.

FRENCH INDUSTRY.

We have already remarked that from the time the means of extracting all free fatty acids from the crude product was discovered, the industry began to go ahead, and as an illustration of this we are able to refer to the firm of refiners, Messrs. Rocca, Tassey and De Roux, of Marseilles. This firm was established in 1866, and introduced commercially the pure coco-nut butter under the brand name of Vegetaline. In England, Messrs. Loders & Nucoline are the largest refiners and manufacturers of coco-nut fat. To the successful efforts of manufacturers, in improving the method of refining, will now and in the future be traced the origin of what bids fair to become an enormous industry, affecting many trades and countries, and bringing prosperity in its train to many of our tropical possessions, as well as to those owned or protected by other countries. In many cases, bringing, through the plantation industries which will be created, new vigour to civilization and new communications to Trade.

The following are interesting extracts from Consular reports:

Report of American Consul at Marseilles:

> "As credit should be given to whom it is due, I may say that the firm Rocca, Tassey and De Roux first developed and made practical the manufacture of an edible grease from Copra oil. They stand high in the Oil trade, and have recently erected works in Hamburg also. . . . . The effort to extract an edible grease from an oil produced upon so vast a scale and formerly available only for the manufacture of soap, gave promise of valuable returns if successful; and that this promise was not delusive may be pledged by the circumstances that the factory, which produced 25 tons of butter per month . . . . now turns out 600 tons per month." . . . .
>
> *Note.*—The Consul's experience or references may only have related to France, seeing that an English firm claims to have been the first to satisfactorily manufacture this article.

Report of English Consul:

> "A new fatty substance for consumption in the United Kingdom to take the place of butter, is being put upon the British market. It is nothing else than the oil extracted from Copra (dried Coco-nut) refined, with all smell and taste neutralised. . . . . It becomes like sweet lard, and is intended to compete with margarine on the breakfast table as a substitute for butter."

It will be noted that in one of the above reports (which are a few years old) reference is made to the producing capacity of the firm being at that time 25 tons per month or 300 tons per annum. The rapid success of this one firm is illustrated in the fact that their total output of Coco-nut butter for 1911 (including their Geneva and Milan factories) will be 34,000 tons, of which they have exported to the United Kingdom no less than 10,000 tons, and their works are now being further extended to a greatly increased manufacturing capacity. In their Marseilles factory they refined 29,000 tons and other firms there refine between 18,000 and 20,000 tons per annum, bringing the total Marseilles output up to between 47,000 and 49,000 tons.

This firm, however, are not the only manufacturers. There are quite a number in England and on the Continent. Messrs. Fred. Boehm, Ltd., of London (agents in the United Kingdom for Messrs. Rocca, Tassey and De Roux), state that the trade is yet in its infancy and that the growing demand for it exceeds the capacity of the refiners, and that, within the next three to five years, it is anticipated the output of coco-nut butter alone will far exceed the production of any other vegetable fat.

The refiners in England are experiencing similar demands, as may be gathered from the experience of one of the largest firms, Messrs. Loders and Nucoline, Ltd., of Silvertown, E. "So great has been the demand for this Company's preparations," says "Confectionery," "that it was found necessary to make arrangements for a very great extension to their plant and premises. To those in the Confectionery Trade who have never had the privilege of going over some such factory, the vast importance of this comparatively modern industry may be quite unknown. The average reader may have some idea that coco-nuts play an important part in certain industries, but we have developed very fast from the times when coco-nuts were chiefly recognised as prizes for coco-nut shies, and when dessicated coco-nut was the only form in which the product was known in confectionery. Its importance as an article of food has come very much to the front . . . and is destined to play a still more important part."

Messrs. Loders and Nucoline, Ltd., confine their operations almost entirely to the products of the coco-nut and are said to be the largest crushers of Copra and manufacturers of its by-products in England. Their output has increased 50 % in the short space of three years, and, so rapidly is the demand growing, that they are still further extending their works to an additional increased capacity of 50 %.

NUT LARD.

"'Nut Lard' is an absolutely pure vegetable fat, extracted from the coco-nut. It is sweeter than ordinary lard or butter, and cheaper than either. It is white, odourless, does not turn rancid and is infinitely superior to ordinary lard for all culinary purposes. It can be used with the most delicate dishes without altering the natural flavour of the dish.

1. 'Nut Lard' contains neither salt nor water.
2. 4-ozs. will go as far as 5-ozs. of butter or ordinary lard.
3. 'Nut Lard' is excellent for all kinds of pastry and puddings and is used in the same manner as butter or ordinary lard.
4. In cold weather, 'Nut Lard' may become hard—it should then be shredded before using. It can be scraped on to the board and dusted over with flour; it will then roll out freely and be ready for mixing.

5. 'Nut Lard' is unequalled for frying fish, it does not splutter, there is no smell, and it can afterwards be strained and kept for future use.

6. 'Nut Lard' is a pleasant addition on the breakfast table, is very nice with toast, the children like it and it is good for them."

VEGETABLE FATS.

Van Den Berghs. The following is extracted from a report of Lord Ebury's address at a meeting of this company held on May 11th, 1910:—

". . . an unprecedented advance was observable in the consumption of margarine. This is attributed . . . . partly **to the adoption of certain vegetable fats as ingredients of manufacture**; but, in any case, **it seems clear that the product has taken a greater hold than ever upon the public taste throughout the entire range of the company's operations.**"

Pearks, Ltd. The following is an extract from a report of a meeting of this company, held on 23rd May, 1910:

". . . . we recently introduced a margarine made entirely from nut fats and milk. . . . We have a very large and **weekly increasing** sale for this article. Its fresh, creamy flavour was a revelation to those who had hitherto ignored this important item of daily food and it **jumped straight away into public favor**. . . . Our 'nut lard' is also a most successful line and the sales increase weekly. It is getting known everywhere as the **purest cooking fat it is possible to procure.**"

SOAP, CANDLES, ETC.

The growth of civilisation and, generally, the higher plane upon which nations live now-a-days, have resulted in an enormously increased demand for these commodities and if we consider the remarkably increased output (due to similar circumstances) of margarine and other edible manufactures, it is not difficult to appreciate the fact that the demand of the world for supplies of animal fats has grown out of all proportion to the supply. The question then arises, how shall we remedy this shortage? To this we find in **vegetable fats** a more than sufficient answer.

It has been proved that vegetable fats (coco-nut fat in particular) are superior to animal fats for the manufacture of butter substitutes and, in some respects, also for soap making; and this fact, taken in connection with the comparatively restricted output of animal fats already alluded to, has created a widespread interest in coco-nut and other vegetable tree products, as well as causing the rise in their prices: moreover, it can safely be predicted that in the future, civilisation will progress at even a greater rate and, with its advance, there will be a correspondingly increased demand for vegetable fats.

A Harvest of the Fruit of the Coco-nut.

SOAP.

The oils or fats from which soap is made are known as "glycerides," or chemical compounds of fatty acids which contain glycerine.

In the process of manufacture, the fats are heated with a solution of a caustic alkali (hardsoap—soda; soft soap—potash) which, not only combines the fatty acids so as to form soap, but separates the glycerine therein. . . . This operation is termed "Saponification."

Glycerine, which for general purposes may be described as the residue of soap making, is, when freed from impurities, a valuable product, in fact, at the moment of writing, the price it commands is so high as to represent a more profitable side of the business than that of the manufacture of the soap itself. At one time, the valuable residue from which glycerine is obtained was thrown away.

The oils or fats used in the manufacture of soap are very varied. New processes and methods for dealing with various fats are constantly being invented. This fact, together with the close manner in which soap makers guard their manufacturing processes and the class of fats they use, makes it difficult to procure information as to the ingredients of soap now being manufactured, but, it may be taken for granted, that vegetable oils or fats are being more and more substituted for animal fats when they are obtainable at prices which are not prohibitive; and in the preparation of marine soap, Coco-nut oil is essential. Coco-nut fat, mixed with animal fats, makes the soap lather more freely.

Abroad, it is said, almost any class of grease is utilised, except in the best soap, but English manufacturers are understood to be more particular and the quality of their soaps (speaking of the industry as a whole) is, at present, far superior to that manufactured abroad.

As an idea of the variety of fats used, the following may be mentioned:

Vegetable oils (such as the products of the Coco-nut tree and the Oil-palm tree), bone grease, horse, ox, hog and sheep fat or grease. Of these, the vegetable oils are much valued.

Resin, among other ingredients, is largely used in the manufacture of soap.

Soap may thus be roughly classifed:

1. Household or Plain Soaps; including yellow, mottled, white or curd, castile and marine soaps.
2. Toilet or fancy soaps, such as the familiar Windsor and Primrose, and the transparent kinds, such as the familiar Pears' brand.
3. Pharmaceutical Soap, such as carbolic soap.
4. Soft soaps.
5. Industrial soaps, such as that used by woollen-workers, calico print makers, etc.
6. Miscellaneous soaps, including petroleum soaps.

The following is an illustrative analysis of the approximate contents of soap:

	PRIMROSE SOAP.	MOTTLED SOAP.
Fatty anhydrides	46.9 per cent.	46.6 per cent.
Resin ,,	13.4 ,,	Nil.
Combined Alkali	7.1 ,,	5.2 ,,
Free ,,	0.2 ,,	0.8 ,,
Other matter	Traces.	2.4 ,,
Water	32.4 ,,	45.0 ,,
	100.0	100.0

CANDLES—NIGHT LIGHTS.

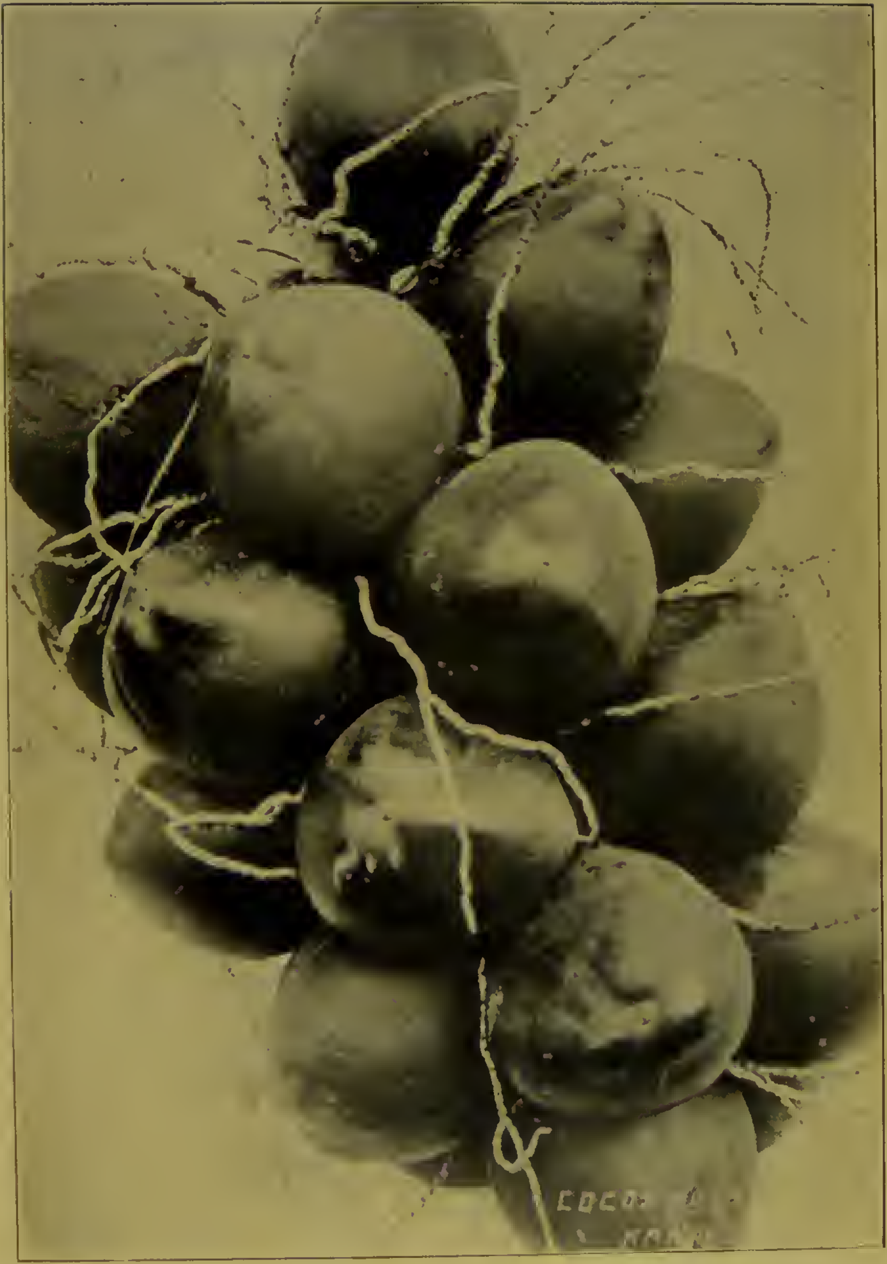
Candles (classified into Composite, Sperm, Stearine, Tallow and Wax) are made from a variety of fats, as also are night lights and tapers. Tallow and "stearine," or their products, are largely used in the manufacture, the latter being a constituent of most animal and of many vegetable fats. It may be described as the "glycerides" of stearic acid and is the hardest of the substances obtained from ordinary fats. In addition to the "stearine" so described, there are also several commercial stearines, such as "coco-nut stearine," "lard stearine," etc. These contain true stearine in varying quantities, but differing from ordinary stearine in that they contain in addition quantities of lower glycerides. They are, in fact, mixtures of at least two glycerides, stearine and palmitin, and generally contain small quantities of olein as well.

The glycerine is removed by various processes and the products are then known as "distilled stearine" and "saponified stearine," which are used in great quantities in the candle making industry.

Night lights were formerly made of wax and spermaceti, but coco-nut oil, fatty acids and palmitic acid, or some variety of stearine, are now generally employed.

THE COCO-NUT TREE.

The stem of the coco-nut is slender and marked by transverse rings which are the scars left by the leaves as they fall. Two such rings are created annually, consequently the age of an individual tree is easily ascertained, its age being equal to half the number of scars on the stem.



A bunch of Coco-nut Fruit from which the top one has become detached.

Its leaves, which exist, along with the fruit, in a bunch or tuft at its summit, are generally only 12 to 15 in number, having the appearance of gigantic ostrich feathers, and are from 12 to 20 feet long; the rest of the stem is unbranched. The large size and hard texture of the leaves render them valuable in their native countries for thatching of dwellings, as material for fencing and even as substitutes for paper to write on; they are also woven into baskets, buckets and lanterns: the base is so compact and cloth-like that it is used for a variety of purposes, such as strainers and wrappers, whilst it is also said to make good hats.

The size of the leaves may be gauged from the fact that the natives sometimes use the mid-rib to serve as oars.

The hard case of the stem is made into cases or drums, besides being used in the construction of huts, and the lower part is so hard as to take on a polish, making it resemble agate.

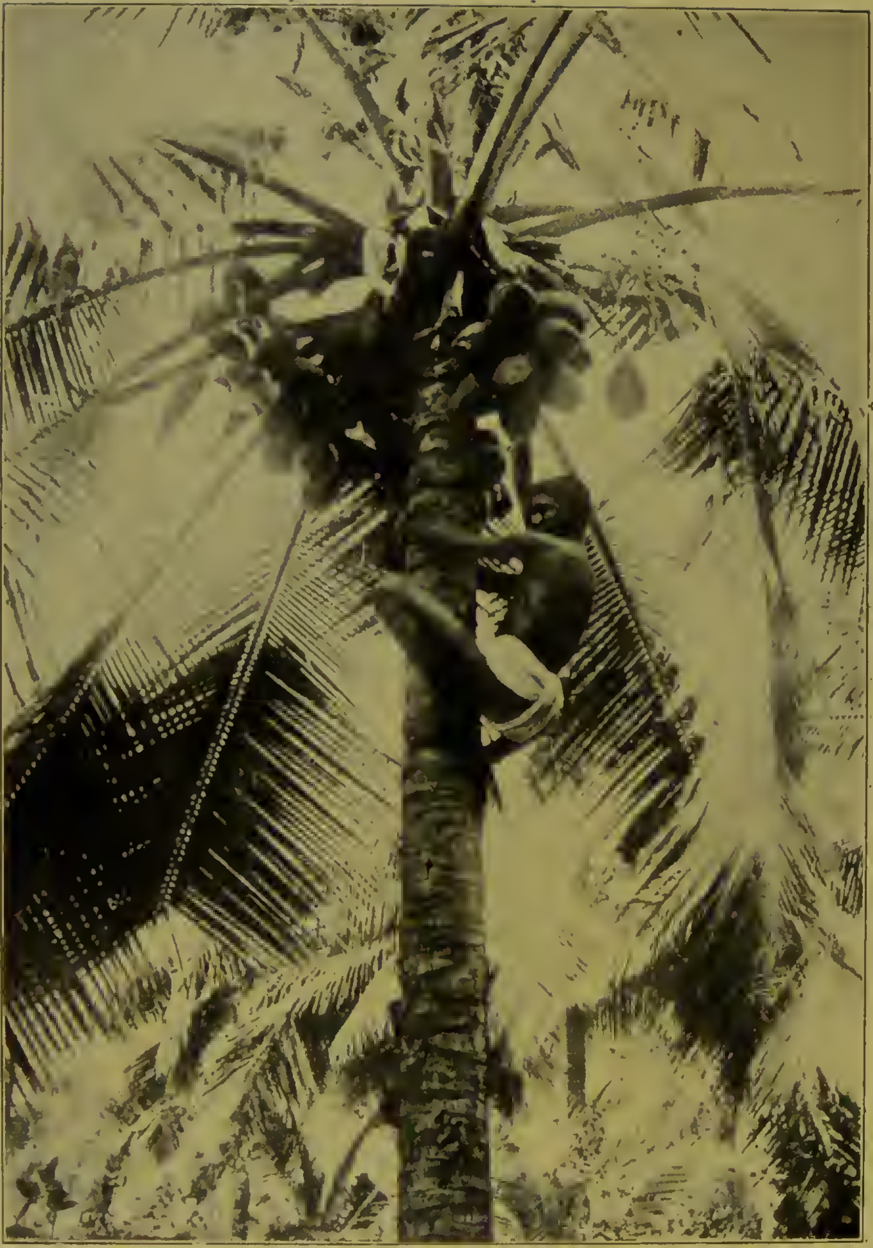
The stem, unlike that of other palms, is solid, is from 1ft. to 2ft. diameter and produces a very heavy and durable wood of a dark brown colour, traversed by longitudinal black seams, and with a fine dense even grain. It is one of the fancy woods of commerce, making handsome and durable furniture; it is also used for walking sticks and as a veneer for fancy articles. In the locality of its growth, it is also used for farm implements and many other articles. In Europe, it goes under the name of "Porcupine Wood." The weight of the wood varies from 40lbs. to 70lbs. per cubic foot.

PROFITABLE INDUSTRY.

The relative small cost of keeping a plantation in order after the trees have arrived at maturity and the high prices which its products now command, make coco-nut growing a profitable industry. Unlike most other plantation industries, the trees require little attention after they have reached maturity.

HEIGHT—MEANS OF COLLECTING.

The tree rises to a height of from 60 to 90 feet. The natives climb the trees by means of the transverse rings or scars previously described and descend with the fruit, passing, as a support against



Native cutting the fruit. Note the rings on tree which aided him to scale it.

falling, a rope round the stem forming a loop which encircles their waists. In some places, however, the ripe nuts are not gathered until they fall.

MOBILITY.

The power which animals possess, of moving from place to place, is one of the causes of their variation, from the necessity of adapting themselves to the conditions of their surroundings. Plants, on the other hand, have to depend on outside agencies for the purpose of changing their location, e.g., by means of birds, which are great carriers of seeds. Nevertheless, each family of plants is exacting in its demands, and many tropical fruits—for instance the banana—require a high temperature to ripen them, others, such as the coco-nut palm, demand, in addition, proximity to the sea. It is one of the curious and interesting features of the coco-nut that whilst it is too large and heavy for birds to carry, nature has provided it with the means of

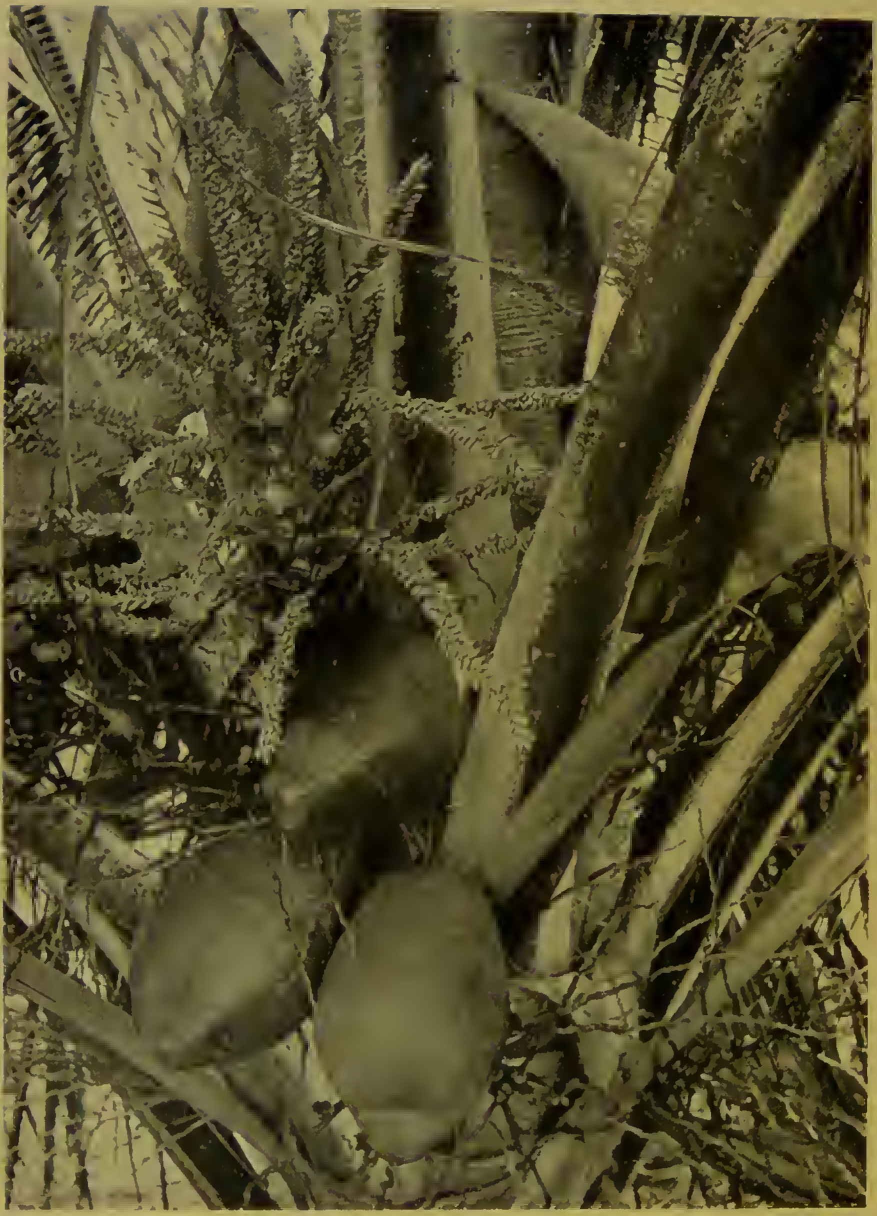
SELF-SOWING AND SELF-MIGRATION.

The seeds, enclosed in their thick fibrous husk, protected by its entangling hair and tough skin, prefer the neighbourhood of the sea and the ripe nut, dropping into the sea, is carried by currents from shore to shore, and has been known to have travelled thousands of miles by ocean currents without getting water logged or losing its power of germination. This self-power of migration is (apart from cultivated plantations) an important factor in its propagation, as it establishes itself upon sandbanks and reefs, especially those of the Coral Islands, as soon as they emerge from the ocean.

Copyright Photo] [*Underwood & Underwood.*

POWER SELF MIGRATION.

The Coco-nut tree prefers the neighbourhood of the sea and the ripe nut, dropping into the sea, is known to have been carried by ocean currents thousands of miles without getting water logged or losing its power of germination.



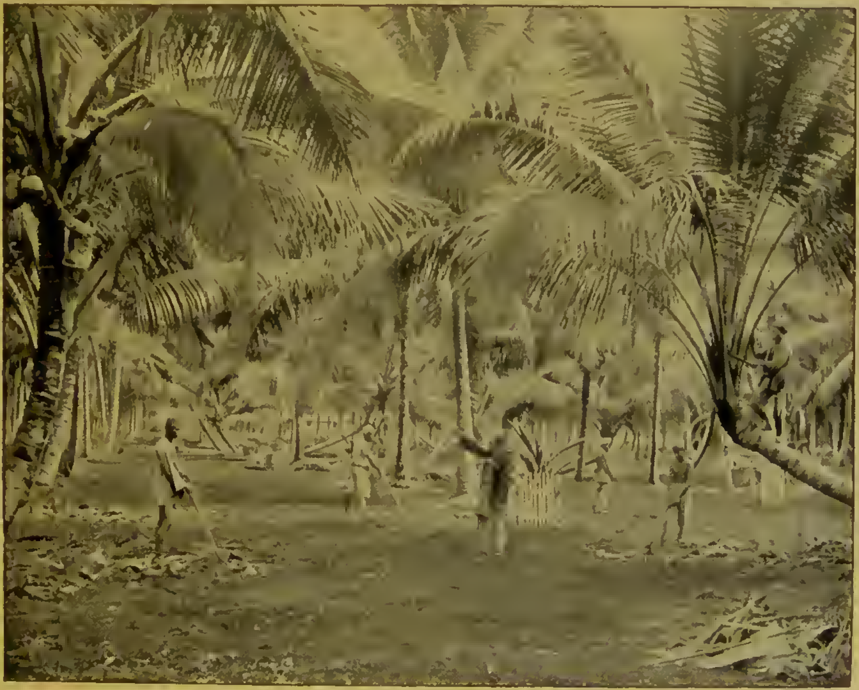
Copyright Photo] COCO-NUT TREE. [*Underwood & Underwood.*

This illustration is a splendid example of how the coco-nut grows. The fruit when ripe falls from the tree. There are no special seasons for collecting, buds, flowers and fruit (in all stages) are a continuous sequence, and on the tree at the same time. Here can be seen the blossom, the fruit forming in all stages, and the mature fruit, but the fruit here shown is of bad shape. The best fruit is more round, not oblong as those here illustrated.

PROPAGATION, PLANTING, GROWTH, ETC.

A nut sprouting and ripe for sowing.

A very considerable amount of information has been collected from many expert sources on the subject of planting and maintenance of plantations. The subject, however, is too voluminous to treat with here and is without the scope of this book. A special work is in course of preparation, in which various experiences are being collated and this should form a very valuable guide to planters and those intending to start plantations. The following general remarks will, however, doubtless be of interest.



Photo] COCO-NUT PLANTATION. [*G. R. Lambert & Co*

This estate is apparently looked after.

Native overseer directing gathering operations. Young plants protected.—A count of leaves on tree to right shows about 13 leaves.

SELECTION OF SEED NUTS.

"The selection of the seed is a very important matter. It should be taken from well-matured trees of medium age (say from 25 to 30 years), showing a good yield and large sized roundish nuts, either red brown or green and not oblong nuts."

SEED NUTS AND THEIR NATURE.

"The seed nut must be picked from the tree in completely dry condition, or may be gathered up. But gathering the nuts green and then drying them in a room is to be avoided, as trees grown from such nuts do not get on well and will generally decay, whereas, the nuts, having become completely dry when on the tree, can be kept for a long time and may be planted, any time from one to twelve months, after collecting. The seed nut must not have too much milk, or on the other hand too little. This is not difficult to ascertain, but it is not easy to describe. They must be half full of milk. After shaking several nuts, it is soon easy to estimate the amount contained in them.

"Every nut must be examined. Nuts containing too much milk will easily rot, whilst those with none will soon perish." Both in choosing nuts for seed or in setting out young palms, it is false economy to select any but the best nuts or the strongest plants.

NURSERY.

"The nuts are planted in a nursery in trenches and are transplanted to required positions within two to eighteen months from the time shoots make their appearance.

"The seed beds must be carefully prepared and well heaped up, but not made so wide as to interfere with watering them in dry weather. Various methods are practised with regard to planting the nut. It should not be planted too deep, nor covered with more than 1½ to 2 inches of earth at the most. Manuring the soil is not necessary, as it only attracts ants and beetles. The beds must be kept clean and the soil loose, to get rid of the grubs of insects.

"A month or two later the shoots will appear and the plants are ready for transplanting at the end of one year, when they will have an average height of 18 inches. The seed beds must be kept moist and the young plants must be watered during a continuance of dry weather, but, generally speaking, as long as the leaves look fresh and of a dark green colour, during drought, there is no need of water, but as soon as they begin to look yellow, moisture at once is required.

TRANSPLANTING.

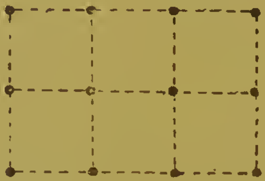
"Care must be taken to remove the plant with the decaying kernel still attached to it, but the roots should be cut rather short, as if this is not done they are liable to rot. All leaves except the inmost ones, must be cut—this diminishes the resistance to the winds and does not harm the young plants."

> Another authority states that in removing the young plants from the seed bed, care should be taken not to injure the roots and that any roots which have become crushed or damaged should be carefully cut back to prevent decay.

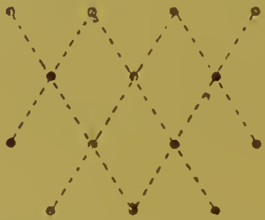
The best system of transplanting from the nursery, is to dig channels or trenches, alongside of the plants, slightly deeper than the bottom of the roots, previously well watering them, so that the earth does not crumble from the roots in removing. Transverse cuts should then be made each side and under the root with a sharp spade having cutting edges, when the young plant can be lifted and removed to its plantation position with its cube of earth, thus retaining with it as much of its natural soil as possible.

SYSTEMATIC PLANTING.

Good trees and profitable plantations are dependent on the care with which the planting in done. In order to obtain the best results the plants require good soil and drainage and plenty of air, light and sun, also sea air and a district where the rainfall is not less than 50 inches. To secure good drainage, the soil should be naturally sandy, yet, as the roots spread under the surface, it should be sufficiently loamy to give the roots a substantial hold. If the soil is heavy, in order to secure good drainage, channels or ditches should be cut through the plantation at frequent intervals. The leaves, as elsewhere stated, grow to 15 to 20 feet in length; therefore, in order to secure the air, light and sun, so necessary, trees should be planted 25 to 30 feet apart, either in parallel lines or diagonally, thus:



Parallel system of planting 25 or 30 feet between each tree.



Diagonical system of planting 25 or 30 feet between each tree.

NATIVE ERRORS.

Natives not appreciating the necessity of space or the economical value of regular planting, mostly plant the trees irregularly and too close (unless under experienced supervision), consequently the trees and the crops suffer from want of light, air and sun, and where plantations are purchased so planted, immediate steps should be taken to thin out. Trees well planted and looked after are said, by experts, to yield an annual average of 60 nuts per tree, but with manuring and attention under favourable conditions, a far higher yield can be obtained. Where planting is regular, with ample space between trees, there is plenty of room for the growth of catch crops (until the trees arrive at mature age), which are a profitable source of additional income and the regular space between the trees or groves permits of machine tilling until the trees become mature and their roots so spread as to make this undesirable.

HOW PLANTATIONS ARE PREPARED.

In all tropical countries uncultivated land is covered with some form of growth and in most cases in preparing ground for cultivation, not only long grass and coarse vegetation are encountered, but trees have to be removed.

Land so overgrown, however, has great advantages in cultivation, in that, during many years of growth, it has produced rich humus. The land is generally cleared by means of cutlasses and by burning, which not only kills pests, but provides ashes which also enrich the soil. When clearing trees it is advisable to leave a few of the largest standing to break the force of winds.

When the land has been cleared and the roots of trees removed or burnt, it is preferable to start by growing some crop thereon whilst the nursery is being prepared. Assuming young plants can be procured or are ready for planting from the nursery, the next step should be to systematically mark off the land and locate the position for each tree. The most convenient method being, to first make a paper plan dividing the land up into sections, dividing each section with a drain or cart road as the case may be and indicating thereon the position of each tree. This plan should be adhered to on the land and the positions of drains, channels, ditches and cart roads marked off by inserting stakes and also carefully measuring the distances between each tree and indicating each position by the insertion of a stake.

Where there is any likelihood of damage from wild animals, such as the wild boar, a strong wire fence should be erected on all boundaries.

The ground having thus been prepared and made ready, planting preparation will be begun.

PREPARING FOR PLANTING.

As has been previously remarked, the degree of success is dependent on the care with which planting is done. Where each stake has been inserted a hole should be dug, at least 3 feet square or in the case of heavy soils preferably 5 feet square, so that the ground is well broken up around the position for the roots of the young plant. These holes and the out-turned soil should be left exposed to the air for two months before planting the trees from the nursery. The out-turned soil should then be mixed with the ashes of the burnt trees and vegetation and with rotted leaf mould or surface humus, or any available manure is an excellent addition. Where the soil is heavy, in order to secure good drainage, 50% of sand should be added if practicable.

PLANTING.

In porous or light soils, such as have been prepared, as indicated, with sand, the root of the plant from the nursery should be placed 20 to 30 inches below the surface, whilst in heavy soils it should not be placed more than 10 inches from the surface.

Planting should be started at the commencement of the rainy season and all available labour engaged in planting throughout the rainy season, the same remark also applies to replacing young plants which have not done well. After setting the plants and filling in, the soil should be stamped down and a stake placed on the side, towards the wind for protection.

AGE OF NURSERY PLANTS.

Experts differ as to the best age to remove plants from the nursery. The ages given varying from two months to eighteen months, but, doubtless, local conditions are mainly responsible for this variation. Trees, however, which are upwards of 2-3 years old are very difficult to transplant owing to their size and heaviness and to the size of the roots, but if such is necessary, the leaves should be tied up first, even cutting them off where absolutely necessary. The roots of the tree when dug up must be carefully clipped, if too large for convenient removal, but as much of the original soil should be retained as is practicable.

Trees so removed will require to be watered daily for six months, except, of course, on rainy days, and trees replanted at this age grow more slowly than young plants and require constant attention.

MAINTAINING NEW PLANTATIONS.

In the first year and second years palms want moisture, but later on they stand dryness pretty well. During extended drought the aid of artificial watering must be resorted to, but after heavy rain care must be taken that there are no pools of water around the palms, as too much wet makes them rot, as is the case with almost all other plants. The small canals or drains throughout the plantation should be renewed or repaired as often as the plantation is cleaned. Manuring has a beneficial effect and greatly hastens the period taken for the trees to mature and come into bearing, besides improving the size and increasing the quality of the nuts.

During the first two years the ground around the stem should be lightly lifted occasionally to a depth of 4 inches, but leaving a space of 9 inches untouched. Later on, turning over the grass will be sufficient. Bushes, stumps, etc., must be removed, as they are favourable haunts for the rhinoceros beetle or other insects. Dried palm leaves may be cut off, but not fresh ones. There is a custom to keep sand and grass round the plant, but this does no good. Burning the grass, when dry, is also useless, as it will injure the palms and retard their growth, and further, it deprives the land of the benefits which it derives from the grass as it rots. Tapping the tree for Tembo (Palm Wine) causes it to bear very little and renders the fruit very small. When the tree first begins to bear it is necessary to support the boughs with sticks to prevent them from breaking down.

CLEANING PLANTATIONS.

Special attention must be paid to regularly cleaning new plantations, by the removal of weeds and by protecting the young trees from noxious insects. This cleaning should be as frequent as possible, the more frequently it is done the less troublesome becomes the plantation; cleaning, however, should not be less than four times during the first six years. It generally takes the form of cutting down weeds or undergrowth with cutlasses. These are either gathered into piles to rot or burn, both courses producing valuable manure. The space round the roots of the trees should receive special attention, the best plan being to hack or hoe out the weeds for a space of 3 feet in diameter for new plants, extending to 8 feet in diameter for older trees.

LABOUR UNDER SUPERVISION.

One labourer will:

(a) Cut 100 planting holes 3 feet square in 13 days.
(b) ,, 100 ,, ,, 5 ,, ,, ,, 17 ,,
(c) Trench, lift, remove and plant (in holes ready for filling in) 12 palms per day, or, say, 100 trees in 9 days, providing the nursery is within reasonable distance of planting area.
(d) Fill and stamp in soil (after plants are set) 100 holes in 9 days.
(e) Properly clean about 2 acres in 10 days.
(f) Hack out, hoe and clean circles round 100 trees in 5 days.

SAVING MAINTENANCE COST.

The cost of maintenance and bringing a new plantation, properly and regularly planted, into bearing, can be largely diminished, and under certain circumstances the entire cost of maintenance can not only be covered but a profit also be shown. This may be effected by:

1. Cutting down undergrowth with reaping machines.
2. Turning ground with tilling machines.
3. Growing crops between the groves. By this a profit is made, but it pauperises the soil to some extent, unless some form of manure is handy for replenishing.
4. Introducing for repressing weeds a mixed culture which does not pauperise the soil.
5. Using the planted area for keeping cattle, which not only keep the grass down and thus diminish the number of labourers required but manure the soil.

Among the suitable plants for interplanting may be mentioned Sugar, Soya Beans, Maize, Cotton, Spanish Pepper, Earth Nuts, Ricinus, Kawi, Coffee, Manilla Hemp, Sisal Hemp, Mountain Rice, Taro, etc.

After the fourth year, however, when the Coco-nut trees are getting nearer their bearing stage, the cultivation of catch crops becomes increasingly difficult as time goes on, owing to the spreading of the roots of the Coco-nut trees.

PRODUCE OF PALMS AND PREPARATION FOR COPRA.*

"A palm, with moderate care, will bloom at the beginning of the sixth year, so that the first crop may be expected at the beginning of the seventh year. The average produce of the palm is estimated at 75 nuts a year. But palms which are well cared for will yield 100 nuts. The nut is ripe as soon as the milk can be heard when shaking it. Nuts with the fibre taken off will not last very long, even when not opened, but soon rot. The ripe nuts are gathered and husked and the inner nut cut in half. The several half nuts are then spread in the sun. Care must be taken that no milk remains in the nuts and you must protect them from damp and rain, otherwise the Copra, when dried, will get a dark colour and rot. The halved nut having been spread out in the sun for two days, no difficulty will be experienced in removing the white flesh, now also dried, and this is called Copra. When removed from the shell, the Copra must still lie for a day or a day-and-a-half, and it is then ready to be dispatched.

"But care must be taken that the Copra is quite dry, otherwise it will quickly rot. The fibre of the outer husk can be used for rope, and the hard shell of the inner husk makes a good fuel.

"Sisal hemp, pepper, even pineapples and pig nuts (earth nuts), may be cultivated together and at the same time as the Coco Palms.

"From experienced observation, palms should be among the most profitable plants in German East Africa."

SYSTEMS OF PLANTING.

The system of planting, which is understood to have proved satisfactory in British North Borneo and elsewhere, is to agree to a price with the natives, for which they clear the ground, plant the trees and deliver them over, when they are three years old, at the pre-arranged contract price per tree.

In the interim, the natives are permitted to draw a reasonable amount on account, and the balance is paid to them at the end of the three years, when the trees are examined and payment completed.

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* Translated from a German article on the treatment of Coco-nut Palms in German East Africa.

By this method, not only is the land cleared and kept cleared, but the nut seeds are transplanted from the nursery and the young shoots and subsequent trees are tended, until they are sufficiently strong and tall to be free of damage from animals and the plantation owner only pays for the delivery of trees in a satisfactory condition.

The natives, in the interim, are permitted to grow what they choose between the trees for their own use, which privilege they look upon as part compensation for their work. The system finds favour among these natives as, whilst it provides them with cash and a means of raising food, they remain for all practical purposes, their own masters.

In the West Indies a similar system, known as METAYER or Contract System, is at present in vogue, which is even more favourable to the planter. There, the natives are lent a parcel of ground upon which are planted the young Coco-nut trees and, at their own expense, they (the natives) interplant sugar canes or other produce, and, besides tending the Coco-nut trees until they come into bearing, they deliver to the plantation owner half their produce of sugar. The natives are generally, however, gratuitously paid 1d. per tree per annum, to encourage the Coco-nut trees being satisfactorily tended. Thus, the planter becomes possessed of the mature Coco-nut trees at little or no expense—the owner gets his young Coco-nut plantation tended and kept free from weeds free of cost, and in addition, has, with the present price of sugar, been left with a profit from his half share of the sugar produced. Two such cases recently came to the writer's notice—on one estate the natives were looking after 10,000 newly planted Coco-nut trees and delivering to the owner 500 barrels of sugar, valued at 30/- per barrel=£750. On the other estate they were tending 12,000 trees and delivering to the owner 200 barrels of sugar valued at £300. When the Coco-nut trees are matured, the roots have then spread as to make other cultivation difficult and the estate is then taken over by the owner and the natives "seek pasture new," or are removed to fresh ground which is to be cultivated in a similar manner and under like onditions.

BEARING TERM.

The time taken from planting to its first producing stage, varies according to the species, the country and climatic conditions. Fruit has been gathered in the Solomon Islands, two and a half years after planting, but three and a half years is the ordinary term for these Islands. In Ceylon, the tree begins to bear about the 6th or 7th year, attains maturity about the 10th year, and the fruit is plucked four or five times in the year. Planters from other countries however state that to pluck more than three times per annum is unwise. Another important factor worthy of special note is that the trees continue yielding fruit until the 70th, 80th or 100th year ; the racemes bear from five to fifteen nuts and ten to twelve bunches grow on each tree, so that the ANNUAL YIELD of the tree is from 50 to 180 nuts.

> "The cultivated areas under Coco-nut Palms in the Pacific Islands cannot be stated with any approach to accuracy and, it is claimed for the palms, that in some of these centres, they reach the bearing age abnormally early when compared, say, with the palms grown in Ceylon, the Malay Peninsula or the Phillipine Islands."

COCO-NUT TREES.

It will be observed that in this picture the trees are not even thinned out but are allowed to grow anyhow.

YIELD OF NUTS PER TREE.

The average annual yield of nuts per tree, as indicated above, naturally varies. One source, however, gives the following table of yields:

Age of Tree.	Average annual yield.
9 years and upwards	60 nuts per tree.
8 ,, ,, ...	40 ,, ,,
7 ,, ,, ...	30 ,, ,,
6 ,, ,, ...	10 ,, ,,

In the West Indies the trees are said to bear one to two bunches of 20-40 nuts in the sixth year.

It, however, should be remarked that some authorities give the *average* production of trees in full bearing at 100 nuts per tree and doubtless this is based on experience obtained on estates which are specially well situated in regard to climate, soil and drainage, and are well looked after. As against this, it may be mentioned that in some districts, especially where the trees are grown on poor, swampy and badly drained land, some of them do not bear at all, or bear only occasionally, and, in one unfavourable locality, the average is placed at 25 nuts per tree. but this poor result is as exceptional as is the good average minimum of 100 nuts per tree. The poor result mentioned is probably due to the land being swampy and, owing to its being always more or less wet, the soil becomes sour and the trees, in such cases, are said to suffer from "wet feet." There is no doubt that the Coco-nut trees thrive best where they are near to the seashore or at least where they are near enough to inhale the ozone-laden breezes or an atmosphere impregnated with sea water. Cultivated trees are greatly improved by their being occasionally fed with common salt. It therefore follows that care is required to be exercised in both the selection of the district and of the situation and character of the soil.

COST OF PLANTING 500 ACRES.

The following are particulars of the cost of opening out, planting and bringing into bearing a given area of 500 acres, containing 50 trees to the acre and, being extracted from a government report, it may be considered fairly reliable.

" Felling and Clearing 500 acres at £2 per acre (exclusive of supervision) ...	£1,000
Lining and Holing ...	150
Cost of 30,000 Coco-nuts ...	120
Planting each (space 27 feet by 27 feet) ...	125
Weeding and maintenance ...	200
Roads and Drains ...	100
House for Superintendent ...	100
Huts for Natives ...	40
Tools ...	40
Supervision ...	300
Recruiting 70 Natives and Fees ...	220
Nurseries ...	20
Medicine Chest ...	5
Transport ...	80
Contingencies ...	200
Expenditure at the end of first year (equal to £5 8s. 0d. per acre) exclusive of rent, lease, or land survey ...	£2,700
Upkeep for 5 years at £750 per annum ...	3,750
Total expenditure for 500 acres at end of 6th year (equal to £13 an acre) ...	£6,450.

In the seventh year the trees should bear 40 nuts each, or 200 tons of Copra. In the ninth year the trees should bear 60 NUTS each or 300 tons of Copra. Healthy trees will live at least 60 years, probably longer. The cost of upkeep might be partly defrayed by the returns from catch crops, reducing the capital outlay very considerably."

Thus, on this basis, assuming no catch crops are grown (or the system elsewhere referred to, of farming out the land in parcels is not adopted) an estate of 2000 acres, containing 100,000 trees would involve a capital outlay (including £1000 for Copra plant) of £26,800, producing in the seventh year, in the district cited, 4,000,000 nuts and in the ninth year, 6,000,000 nuts. On the basis of 5000 nuts being required to make one ton of Copra, this would produce 1200 tons of Copra and the return on this basis would be as follows :

Value of Copra taken at £28 per ton, 1200 tons ...		£33,000
Deduct (a) Yearly cost of upkeep ...	3,000	
(b) Cost of collecting and making Copra at £5 per ton...	6,000	
(c) Freight, Insurance and contingencies at £2 per ton ...	2,400	
		11,400
Profit ...		£21,600

This in itself is an exceedingly lucrative return, but to it must be added a very considerable profit to be made from the manufacture of Coir.

It must also be observed that the production is based on the conservative estimate of 5000 nuts being required to make one ton of Copra. In an expert German Report it is stated, from a careful test, that an average of 4448 nuts will produce a metric ton (2205 lbs.) of Copra, whilst 3703 selected nuts only were required. Also, it will be noticed, the number of nuts per tree is based only on 50 per annum, whilst on a well-tended estate the return should be far higher.

Another authority gives the first year's cost of 2000 acres at £6850 with 70 trees to the acre, and the total cost at the end of the sixth year, including £1000 for Copra plant and £1000 for Coir plant, £20,350.

In the succeeding years the revenue and expenditure is given as follows:—

	Upkeep, etc.	Gross Returns,	Net Profits
Seventh Year	£2,600	£12,280	£9,680
Eighth ,, ...	3,500	18,800	15,300
Ninth ,, ...	4,300	27,320	23,020
Tenth ,, ...	5,500	36,080	30,580

The latter estimate is based on Copra being at £21 per ton, whereas to-day it is nearly a third higher, £27—£30 per ton. It is not, however, clear that any provision has been made for freight, etc. However, the margin in price is so great that even, after allowing for this, the profits on the basis given would be much higher.

COCO-NUT TREES.—GATHERED FRUIT.

The following is also given by a source as to the profit which may be expected on Capital expended in the planting of suitable virgin ground with coco-nut trees.

From	7th Year.	8th Year.	9th Year.
Copra ...	14½%	22½%	32½%
Coir Fibre	10%	15%	22½%
	24½%	37½%	55%

It is also stated that the tree does not yield its full supply until its 20th year, when, the same source states, the return on Capital outlay should be double those given.

Another authority gives the cost of establishing a coco-nut plantation with 60 trees to the acre at British Honduras, until it comes into bearing, including all expenses, at £8 per acre.

As a useful comparative illustration of the most economical method of cultivating an estate, we cite the following cost of planting 500 acres on the "METAYER" System, compiled from information supplied by a West Indian planter of many years' experience:

	£
Cost of purchasing seed nuts, creating, tending and producing in a nursery 25,000 strong one-year-old trees produced from selected Venezuelan seed nuts ...	350
Cost of clearing estate under "Metayer" System is nil, but in order to accelerate time occupied in planting, allowance is made for gratuitous bonuses	100
Marking out estate, planting 25,000 young trees from nursery with seaweed manure, lime and salt (10/- per acre, containing 50-60 trees)	250

METAYER SYSTEM.

Under this system, as explained elsewhere, the land is loaned to natives, who interplant sugar between the young Coco-nut trees at their own expense and, besides keeping the soil clean and tending the young Coco-nut trees, they deliver over half their produce of sugar to the owner. The owner, however, if the Coco-nut trees are well looked after, gratuitously pays the natives, when the mature and bearing Coco-nut trees are taken over and the natives move to fresh ground at the end of the fifth year, 6d. for each satisfactory tree, which, on 25,000 trees, equals	625
Government Taxes, replacing unsatisfactory plants, overseers' wages, sugar factory expenses, sundries and contingencies	1,000
Total ...	£2,325

Under the above System, in the illustration cited, it is reckoned that a minimum of 500 barrels of sugar per annum could be relied on to be delivered to the owner as his share from the natives for four[*] years, which, at the present value of 30/- per barrel, would be equal to £750 per annum for four years ...	3,000
Deduct cost given previously	2,325
Net profit first five years, plus 500 acres, containing 25,000 matured and bearing Coco-nut trees	£675

[*] No produce is calculated for the fifth year, as, owing to spread of roots of trees, it would be unreliable.

Revenue 6th year, when the matured Coco-nut trees are taken over by plantation owner:

25,000 trees based on 20 nuts per tree (the trees bear 20-40 nuts in 5th-6th years from planting one-year-old plants) = 500,000 nuts, which, on a basis of 5,000 nuts to one ton of Copra = 100 tons of Copra, valued at £28 per ton	£2,800
Less estate expenses and of collecting and making Copra, bagging, freight charges, and contingencies, at say, £7 per ton	700
Net Profit ...	£2,100

7th Year.

At 50 nuts per tree = 1,250,000 nuts = 250 tons of Copra, at £28 per ton, less £7 per ton expenses = net profit £5,250

8th and succeeding years.

At 70 nuts per tree = 1,750,000 nuts = 350 tons of Copra at £28 per ton, less £7 per ton expenses = net profit £7,350

Nothing is taken into account here for the manufacture of Coir and Fibre, which is an industry as yet very little known in the West Indies.

The only capital outlay would be the cost of the land and the sugar-making plant, an expense which is not a considerable item.

SITUATION.

As previously remarked, the tree likes the sea-coast ; this, however, is not essential, as it is also found inland even at an elevation of 2900 feet, but sun exposure is necessary and it thrives best on ground where natural drainage exists, and where it can get the benefit of the sea breeze.

WHERE IT GROWS.

The coco-nut tree is now widely distributed and is to be found in all tropical countries, thriving best between 15° N. lat. and 12° S. lat. In the Coral Islands and in the Indian Islands, it is the commonest form of large vegetation. It thrives on the coast of Ceylon, millions are to be seen on the coasts of India and Brazil and generally, it may be said, it grows abundantly on the Pacific Islands, East Coast of Borneo, in the West and East Indies and in tropical East and West Africa, etc., etc.

IMPORTANT NOTICE.

Purchasers of this work, filling up the attached Coupon, will receive from time to time post free, additional information of importance and interest relating to this particular industry, and thereby purchasers will be kept well informed upon the industry and its developments.

EXHIBITION.

We have collected samples of the various products of the Coconut which are daily on Exhibition at our offices, and all purchasers of this book are particularly invited to call and inspect the same. Arrangements have also been made to provide a small case of specimens of the chief products. These cases will be despatched carriage paid (U.K. only), on receipt of P.O. for 5s.

FREE COUPON.

To Curtis Gardner & Co., Ltd. Spencer House, South Place, Finsbury, E.C.

Having purchased a copy of your book, "The Cult of the Coconut," I request you to forward me, *free of any charge*, such additional information as you may have available from time to time on this industry.

Name ....

Address ....

....

N.B.—This coupon must be detached and posted. Only one coupon issued with each book.

COCO-NUT PRODUCTS.

IMPORTS INTO GREAT BRITAIN.

Refined and Unrefined Coco-nut Oil.

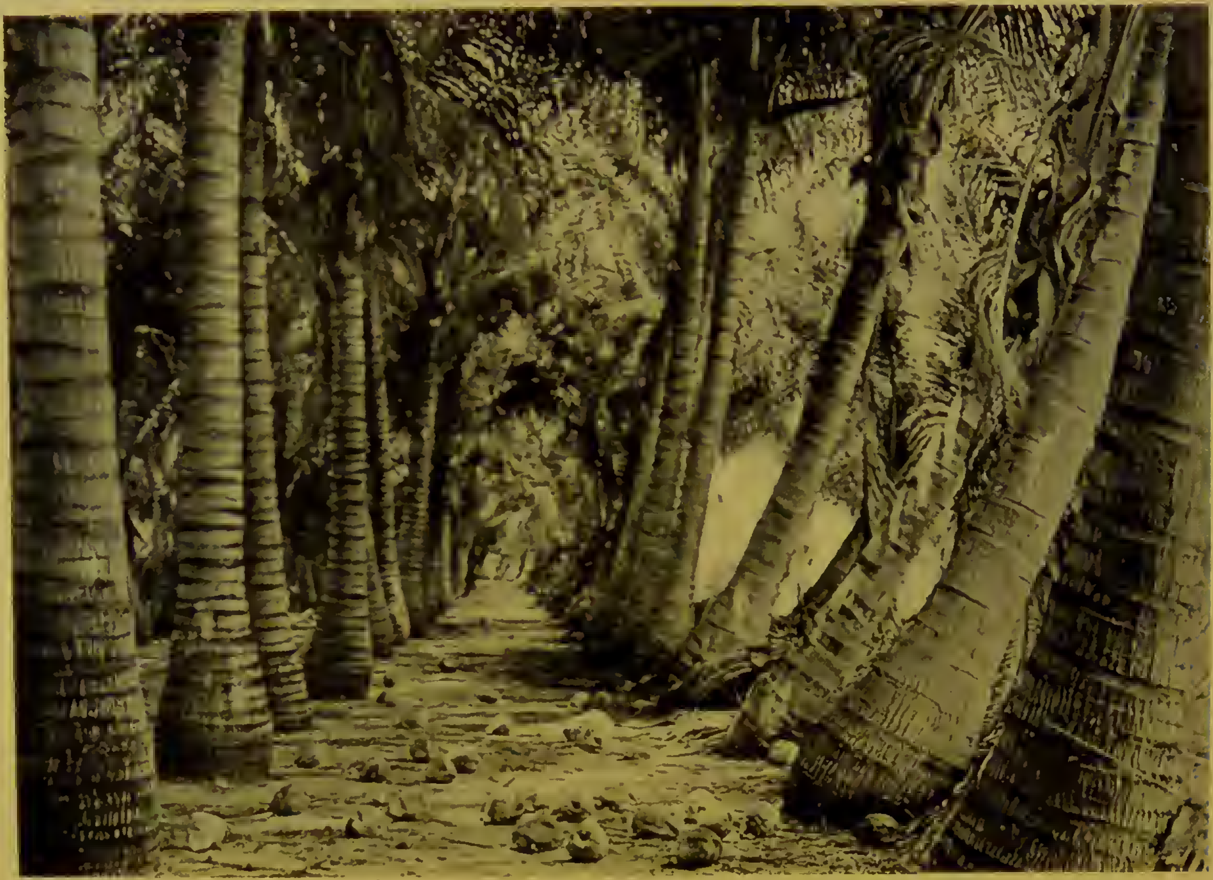
Year.	Cwts.	Value. £
1906 ..	**538,036**	**803,417**
1909 ...	**679,493**	**1,067,941**
1910 ...	**1,0 9,905**	**2,150,365**

COUNTRIES WHENCE IMPORTED.

Refined and Unrefined.

Year 1910.

Countries.	Quantities. Cwts.	Value. £
Denmark (including Faroe Islands) ...	10,267	20,435
Germany	156,523	342,822
Belgium	77,021	169,091
France	340,432	755,945
Philippine Islands and Guam	None since 1908, probably all wanted by U.S.A.	
Other Foreign Countries	12,512	25,666
Mauritius and Dependencies	894	1,782
British India	50,620	104,356
Straits Settlements and Dependencies, including Labuan	None since 1908, probably exported elsewhere.	
Ceylon and Dependencies	312,290	595,286
Australia	79,335	134,959
Other British Possessions	11	23
Total for 1910 ... Cwts.	**1,039,905**	**£2,150,365**
Total from Foreign Countries	596,755	1,313,959
„ „ British Possessions	443,150	836,406
Cwts.	**1,039,905**	**£2,150,365**



Copyright Photo] A GROVE OF COCO-NUTS. [*Underwood & Underwood.*

Here will clearly be observed the transverse rings or scars by which the natives easily mount the trees, two of such rings or scars are formed annually, being created by the leaves as they fall, consequently the age of an individual tree is easily ascertained equaling one half the number of scars or rings thereon.

EXPORTS.
Refined and Unrefined.
Year 1910.

	Quantity cwts.	Value £
United States of America	112,565	204,032
Germany	23,437	48,572
Russia	1,576	3,969
Belgium	3,432	6,263
Denmark	14,533	32,537
Netherlands	211,472	395,807
Other Foreign Countries	41,444	81,778
Total to Foreign Countries	Cwts. **408,459**	**£772,958**
Canada	1,220	2,698
Transvaal	5	14
Newfoundland and Coast of Labrador	1,676	3,825
Other British Possessions	11,978	27,545
Total to British Possessions	Cwts. **14,879**	**£34,082**
Grand Total	Cwts. **423,338**	**£807,040**

COPRA IMPORTS AND EXPORTS.*

Germany, France, the Netherlands, Belgium, and the United States, have a more complete method of compiling their statistics than Great Britain, therefore, whilst we have been able to give information regarding the Copra imports and exports of those countries, it is not possible to do so in regard to our own, although we import a considerable amount of the product; the amount of Copra imported and exported into Great Britain is, we understand, included in the following Blue book returns:

IMPORTS.

	Value.		
	1906.	1909.	1910.
	£	£	£
Nuts and kernels for expressing oil therefrom.	894,836	1,186,896	1,915,279
Oil-seed cake, other than cotton seed, linseed and rape seed	143,175	191,248	185,671

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*It may be a matter of public interest for the writer to state that during the period of the Tariff Reform controversy, he endeavoured to investigate the official statistics of our Imports and Exports, and some, at least, of the methods of arriving thereat, but came to the conclusion, after spending some considerable time, that not only was it useless to pursue the matter further, but that neither the Statistical Department, Tariff Reformers, or Free Traders could produce any reliable figures as to the true trade of this country, and the opinion he formed, and still holds, is that the present system is such that the true trade of the country cannot be arrived at, and the present figures are of little or no value. In fact, they are dangerous, and so far as the Tariff question is concerned, whatever may be the party convictions, neither party will be able to produce unanswerable statistics until the present methods of arriving at them, are entirely re-modelled.

Other imports probably containing products of coco-nut tree or palm oil tree.

	1906.	1909.	1910.
	£	£	£
Candles	18,596	15.066	14,497
Soap	522,169	451,410	454,038
Margarine	2,733,795	2,243,737	2,935,244
Tallow and Stearine ...	2,795,821	3,359,962	4,194,489

EXPORTS.

		Value.	
Nuts and kernels for expressing oil therefrom.	1906. £ 212,352	1909. £ 427,846	1910. £ 539,182
Oil-seed cake, other than cotton seed, linseed and rape seed	13,226	8,600	11,315

Other exports probably containing products of coco-nut tree or palm-oil tree.

	1906.	1909.	1910.
	£	£	£
Candles	595,304	495,861	485,218
Soap	1,309,556	1,536.368	1,797,543
Margarine	44,140	113,268	194,350
Tallow and Stearine ...	1,450,861	1,645,574	2,259,427

Remarkable Increase in Germany's Trade.

GERMANY.*[1]

IMPORTS.

COPRA.	Quantity cwts.		Value in Sterling.
1908	1,647,023	... ...	£1,510,150
1909	2,207,860	... ...	2,325,350
1910	**3,070,639**	... ...	**4,125,300**

COCO-NUT OIL	cwts.		
1908	99,919	... ...	£120,050
1909	178,130	... ...	231,050
1910	**175,319**	... ...	**304,350**

The following table of German Imports and Exports*[1] will show at a glance the enormous increase in Germany's consumption of Coco-nut fat.

*[1] All figures herein relating to Germany are compiled from German Government official books. (System, 20 Marks = £1. 50·8 Kilos = 1 cwt.)

COPRA AND COCO-NUT OIL.

Imports.		£	Exports.		£
1908	...	1,630,200	1908	...	229,350
1910	...	**4,429,650**	**1910**	...	**466,900**

Germany's net home consumption, therefore, shows the enormous rise in three years from under a million and a half sterling to nearly FOUR MILLIONS STERLING.

The MAGNITUDE, importance and rapid growth of Germany's Imports of Copra, Coco-nut Oil, Palm Oil and Palm Kernels will at once be seen from the following totals:

Total Imports of Germany only.

		£
1908	... ...	**4,128,950**
1910	... ...	**9,272,550**

FRANCE.*[2]

IMPORTS.

COPRA.

			Total Quantity. Cwts.		For consumption. Quantity in cwts.		For consumption. Value in sterling.
1908	...	...	3,333,817	...	2,992,218	...	£2,456,400.
1909	...	...	2,777,039	...	2,579,828	...	2,437,640.
1910	...	...	**3,273,744**	...	**3,027,899**	...	**2,861,000.**

The decrease in imports in 1909 may be due to refiners restricting their output in anticipation of a fall in the rising prices for Copra. The French blue books are so compiled that it is difficult to obtain accurate detail of the various other by-products of the coco-nut. We have, however, taken steps to endeavour to obtain more complete information which will be published later. We have made similar observations regarding British statistics. The German statistics are very complete. From private information, we understand that the imports of France for 1911 are likely to very considerably exceed those of 1910 which is due to the increasing demand and consumption and to refiners having recognized that there is no prospect of lower prices ruling for the raw material.

*[2] The arrangement of the French Government blue books is thus: IMPORTS (1), Total Imports (2), Nett Imports for internal consumption or manufacture of which nett amount the quantity and value are given. EXPORTS (1) Total Exports (2) Nett Exports of goods manufactured or treated in France, of which nett amount the quantity and value are given. The value given is therefore of the amount imported for consumption and the value of the total import would therefore be proportionately greater. The figures of imports of coco-nut oil are not classified, and are, therefore, not available.

(System, 26 fcs. = £1. 50·8 kilos = 1 cwt.)

HOLLAND.[*3]

IMPORTS.

COPRA.	Quantity in cwts.	Value in sterling.
1908	1,406,143	£2,142,963
1909	1,219,320	1,858,244
1910	**1,858,695**	**2,832,651**

COCO-NUT OIL.		
1908	206,011	£436,066
1909	243,716	515,865
1910	**621,259**	**1,314,999**

DUTCH IMPORTS OF COPRA AND COCO-NUT OIL.

	£
1908	**2,579,029**
1909	**2,374,109**
1910	**4,147,650**

The importance and rapid growth of the Dutch Imports of Copra, Coco-nut Oil, Palm Oil and Palm Kernels, can be seen from the following totals:

	£
1908	**3,858,044**
1910	**5,495,941**

BELGIUM.[*4]

IMPORTS.

COPRA.	Quantity in cwts.	Value in Sterling.
1908	683,894	£797,950
1909	838,921	1,018,550
1910	**610,736**	**781,840**

COCO-NUT OIL		
1908	60,127	£98,964
1909	113,182	197,212
1910	**102,056**	**202,319**

Belgium's imports of Copra, Coco-nut Oil, Palm Oil and Palm Kernels for 1910 were valued at **£1,548,660**.

[*3] The figures are from the Dutch Government statistical record. (System, 12 florins = £1. 50·8 kilos = 1 cwt.)

[*4] (System, 25 fcs. = £1. 50·8 kilos = 1 cwt.)

UNITED STATES.*[5]

IMPORTS.

COPRA.	Quantity in cwts. (English).	Value in sterling.
1908	126,085	£96,246
1909	210,201	133,364
1910	**190,234**	**152,512**

COCO-NUT OIL.		
1908	405,558	£653,517
1909	468,665	615,936
1910	**431,657**	**668,281**

The U.S.A. Imports of Copra, Coco-nut Oil, and Palm Oil, for 1910, were valued at £1,938,900.

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*[5] The U.S increase is confined more largely to palm oil, details of which will be found under that heading. Owing to the enormous supplies of animal fats and other vegetable fats ready at hand, the United States apparently is at present not so concerned in this industry. (System, $5 = £1. 112 lbs. = 1 cwt.)

Canal through a Palm Grove.

Enormous Growth of Trade.

SUMMARY FIGURES.

COPRA AND COCO-NUT OIL.

IMPORTS OF SIX COUNTRIES.

NOTE.—The British Imports of Copra are not available and therefore are not included herein. The imports of Coco-nut Oil by France are not available and also are not included. The imports of Copra by Great Britain must be a considerable amount and are very important figures to be added, but although these are excluded the following will serve to indicate the magnitude and rapid growth of the industry.

	1908. £	1910. £
GREAT BRITAIN*[1] (Coco-nut oil only.)	803,417	**2,150,365**
GERMANY	1,630,200	**4,429,650**
FRANCE*[2] (Copra only.)	2,456,400	**2,861,000**
HOLLAND	2,579,029	**4,147,650**
BELGIUM	896,914	**984,159**
UNITED STATES	749,763	**820,793**
	£9,115,723	**£15,393,617**

Total Imports—1908 ... **£9,115,723**

1910 ... **£15,393,617**

*[1] Copra not included. Figures are for 1906.

*[2] Coco-nut oil imports not included.

COPRA, COCO-NUT OIL, PALM OIL AND PALM KERNELS.

IMPORTS OF SIX COUNTRIES.

(See Notes at foot.)

	1908. £	1910. £
GREAT BRITAIN*[a]	2,335,229	**5,318,779**
GERMANY	4,128,950	**9,272,550**
FRANCE*[b]	2,936,800	**3,288,320**
HOLLAND	3,858,044	**5,495 941**
BELGIUM	1,183,174	**1,548,660**
U.S.A.	1,119,685	**1,938,900**
	£15,561,882	**£26,863,150**

*[a] The imports of Copra and Palm kernels not included. Figures in this case are for 1909.

*[b] Coco-nut oil not included.

Packing Department for Home consumption—Rocca. Tassy, and De Roux.

Miscellaneous information extracted from latest available Government reports:

FIJI.—"The area under Coco-nuts is estimated at 29,759 acres, but this represents European cultivation only—no returns of areas cultivated by natives being furnished or procurable. Native Coco-nut groves, however, cover a large area of land, and the cultivation and preservation of these areas is fostered by Government. The total value of Copra exported during 1909 was £226,599, the quantity produced being 15,880 tons; as against £154,488 and 12,931 tons during the preceding year."

STRAITS SETTLEMENTS.—"The cultivation of Coco-nuts is extending, and a bigger trade was done in 1909 than in the previous year."

JAMAICA.—"Exported Coco-nuts of the value of £54,941 in 1909 against £44,523 in the previous year."

TRINIDAD AND TOBAGO.—"The value of Coco-nuts exported was £63,936 for 1909-10 as compared with £57,284 in 1908-9. The volume and value of exports of this product have grown steadily during the past few years, owing to good prices, the figures being 20,300,173 nuts as above stated, as against 11,037,932, valued at £29,228 in 1905-6."

BRITISH GUIANA.—"Coco-nuts were grown on some 9466 acres of land. The average last year was 8315 and the year before 6810. The export of nuts increased from 637,659 to 711,512. There is abundance of land suitable for this cultivation, and given proper cultivation and drainage, the yearly crop could be very largely increased. The potentialities of the Colony are undoubtedly great, and its most urgent need is a steady influx of enterprising Colonists with brains and capital."

BRITISH HONDURAS.—"The numbers of Coco-nuts shipped was higher than it has ever been before." The numbers exported were as follows: 1909, 5,545,679; 1908, 5,072,150; 1907, 4,550,175, and their respective values, $91,171, $83,068, and $80,171.

BAHAMAS.—"The export has dwindled to nothing, but suitable land exists in plenty, and only market and communications are needed."

TONGAN ISLANDS.—"Copra, the staple export, is generally shipped in bags or sacks. The year's increased output, therefore, may be fairly accurately gauged by the great increase in the value of imports." The cultivation of Coco-nuts and fruit, the principal articles of export, is not systematically followed by the natives. . . . Land may be leased from the Chiefs and Government in blocks of 100-200 acres for 25 to 50 years, with option of renewal. . . . The average cost of clearing is approximately £15 per acre without ploughing. Coco-nuts, which come into bearing in six or more years, cost about £9 per acre to plant.

SEYCHELLES.—A normal crop of Copra—2323 tons—was exported in 1909, valued Rs. 533,714, of which France took Rs. 455,558. Soap and Coco-nut Oil were exported to Madagascar valued Rs. 65,689.

SIERRA LEONE.—"Coco-nut trees exist in the Colony, and the fruit obtains a ready sale locally as an article of food, the price realised being nearly the same as in England. The supply of trees is not sufficient to enable the Copra and Coir industries to be taken up. The Government has tried to encourage the Coco-nut industry, but so far without success. The natives of the Colony have a rooted objection to raise any more trees, those already existing having been raised by their grandfathers, under, perhaps, missionary or Government influence. An attempt was made during the year to introduce Coco-nut growing in the lowlands surrounding the tidal waters in the Protectorate, but the attempt failed, partly owing to the difficulty of obtaining mature nuts to plant, and partly to the neglect of the Chiefs to water them when planted—*the Chiefs arguing that because the nut contained liquid there was no need to water the young plant.*"

GOLD COAST.—"The increase in exports is due to the expansion of the agricultural industry and the consequent larger shipments of economic products."

Exports Copra, 755 tons, value £13,032, 1910.
,, ,, 809 ,, ,, 10,451, 1909.
,, ,, 613 ,, ,, 6,490, 1908.

CEYLON.—"It is noticeable that foreign countries spent 80 per cent. more than the United Kingdom and British Possessions on the products of the Coco-nut Palm. Of the total value of Ceylon produce exported, the products of the Coco-nut Palm represents 22·5 per cent. There was an increase in the value of the products of the Coco-nut Palm. The export of Copra has surpassed even the record figure established in the preceding year."

Exports, 1909, Rs. 32,398,600; 1908, Rs. 29,364,300.

Another authority states: "It is significant that Germany, Austria, and Belgium are taking yearly an increasing proportion of output."

GOLD COAST.

Gov. Gold Coast Reports, 1909-1910.

		Tons.	Value. £
COPRA	1908	613	6,490
	1909	809	10,451
	1910	755	13,032
		Tons.	£
Palm Oil Kernels	1908	8,956	77,821
	1909	11,598	112,425
	1910	14,182	185,058
		Galls.	£
Palm Oil	1908	2,255,371	129,535
	1909	2,007,296	120,978†
	1910	2,044,868	161,388

†Decrease partially explained by the gallonage being recorded in Imperial in place of old wine gallons for the first time. 1909 Report.

	1908.	Value £	
Copra	613 tons ...	6,490	
Palm Kernels ...	8,956 „ ...	77,821	
„ Oil	2,255,371 galls. ...	129,535	
			£213,846.
	1909.	£	
Copra	809 tons ...	10,451	
Palm Kernels ...	11,598 „ ...	112,425	
„ Oil	2,007,296 galls. ...	120,978	
			£243,854.
	1910.	£	
Copra	755 tons ...	13,032	
Palm Kernels ...	14,182 „ ...	185,058	
„ Oil	2,044,868 galls. ...	161,388	
			£359,478.

DEVELOPMENTS IN WEST AFRICA.

In West Africa alone, which exports Coco-nut oil, copra, palm oil and palm kernels, immense strides will in the near future be made, and probably commercial uses be discovered for many new vegetable products. This latter possibility was evidenced recently in a Government report of one Colony, stating "The kernels of Carapa seeds were valued at £11 5s. 0d. per ton by a firm of oilseed crushers, who offered to take a trial consignment of 50 tons of kernels at this price."

VAST PROSPERITY.

The "Times," in a special article on September 4th, 1911, said: "Up to within the most recent years the grievance on matters connected with the West Coast of Africa has been widespread, and at the present moment the possibilities of the future development, not only of our own Colonies and Protectorates, but of those of France and Germany, are unknown to all but few, who are actively interesting themselves in important questions whose solution will mean a vast measure in the prosperity of West Africa."

MISCELLANEOUS.

Java alone exported 117,000 tons of Copra in 1910.

Copyright Photo] [*Underwood & Underwood.*

This picture illustrates a game, practised by native boys. The clinging power of their toes enables them to rush up these giddy slopes without fear or accident. Once the tree-top has been gained, the winner will amuse himself by pelting his rivals with huge coco-nuts.

Copyright Photo] [*Underwood & Underwood.*

THEOBROMA CACAO.

Cocoa, or cacao, is quite a different kind of tree and fruit from that of the coco-nut, as will be gathered from this illustration of its fruit, which, unlike the coco-nut, grows on the stems. This tree is being cultivated in enormous numbers to provide the ever-increasing demand for cocoa, and is to be found in the same districts as the coco-nut tree.

FORTUNES IN THE AUSTRALIAN TROPICS.

PLANTATIONS IN PAPUA AND THE SOLOMON ISLANDS.—PRODUCE AND TRANSPORTATION.—HANDSOME PROFITS.—COCO PALM INCOMES.

Extracted from "World's Work," October, 1911.

"There are few parts of the world where the opportunities for making a competence are so many as in the tropical islands off the Australian coast. To the North, eighteen hours, lies Papua, containing 58,000,000 acres, of which only 337,000 acres are taken up under lease. Three hundred miles from the extreme East of Papua are the Solomons, with hundreds of islands, idle and waiting to be occupied. . . . .

"The cost of clearing the land in the Solomons is about 36s. per acre; while in Papua the cost is higher. . . . .

"The land will produce all kinds of fruits and crops, but Copra, rubber, cotton, sisal hemp, flax, sago, coffee, indigo and sugar are indigenous, and offer sufficient scope for the planter. The fruits are oranges, pomelloes, pawpaws, bananas, pines, guavas, bread-fruit, coco-nut; while tomatoes, pumpkins, lettuce, sweet potatoes, grow luxuriantly. . . . .

"One young man ran away from his ship five years ago. He now owns a plantation, a schooner, and £2000. Two others leased 300 acres and planted rubber. One acts as overseer while the other is temporarily engaged by the Government, and thus brings grist to the mill until their crop matures.

"Natives are engaged to clear the land at wages of £6 each per annum. To this must be added the cost of clothing—usually two yards of calico around the loins—and food of rice, yams, sweet potatoes, coco-nuts and bananas. The manager of the plantation stated that wages, clothing and food for his natives averaged a cost of 6d. each per day; but he grew a large proportion of native foods to reduce the necessity of supplying the more costly imported rice. The natives prefer such food, but rice is given to provide variety. Meat is never given to natives on plantations, and water is the only beverage.

"After clearing the land, coco-nuts are . . . . . . strung on upright poles in the open air to germinate and throw out of the eyes tender shoots. The nut is then planted in the soil half exposed — as a placed football for a try — so that the milk may rest at the base and side nearest the soil. The nuts are planted 20 by 20 or 16 by 16 feet apart, in parallel rows, and the duty of the native is to keep clear and clean the avenues between, so that the young palms may not be choked by the jungle which grows so quickly and densely.

"When the plantation is laid out and planted, the owner must tend the palms, and wait until the crop arrives. Coco-nut palms will grow to 25 or 30 feet high in five years, and produce fruit at three and a half years. Fruit has been gathered from palms in the Solomons at two and a half years, thus beating all records elsewhere. In Ceylon it takes seven years to produce nuts. Meanwhile, stand-by crops may be grown in the avenues between the coco-nuts. Cotton and maize, with two crops of each annually, will pay almost all the current expenses of the plantation.

COCO-NUT PALM INCOMES.*

"The coco-nut palm produces from 100 to 120 nuts each year. Six thousand nuts make one ton of Copra, which at the steamer's side is worth £11, or, if freighted to Sydney, then £13 to £15 per ton, according to the fluctuations of the market. Each coco-nut tree when mature gives an income of from 2 6 to 3 6 annually. The planter with 25,000 coco palms may be certain of a handsome income for one hundred years or longer.

"The market for Copra is extending every year. . . . When broken into small pieces and exposed on trays for three days it is ready to be bagged and freighted to market. Smoke-dried Copra realises £1 less per ton. The process is easy, simple and profitable. At the factory 75 per cent. of the nut is extracted as oil of rich amber colour. . . . . .

"There is another source of revenue open, which is remunerative beyond belief, to the man of small capital. While waiting the returns from his plantation he may trade with the natives by the barter of calicoes, heads, ornaments, axes, knives, wire, fishing hooks, scrap iron and mirrors, in exchange for Copra, ivory-nuts, rubber, sago, spears, arrows, shells and curios. These find a ready market in Australia. The profits of one trader, with a capital of £50, totalled £200 in fifteen months in direct trade with the natives.

"With £500 capital success as a planter is fairly assured. With less (and others have started with less) the struggle is keen, but the prospects are bright and the profits large."

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* The number of nuts which a tree yields varies in different districts, as also do the size of nuts and the number required to make a ton of copra. The present market price of copra in England is about £30 per ton.

THE OUTLOOK FOR THE COCO-NUT INDUSTRY IN WEST AFRICA.

ACTIVE DEVELOPMENT OF LANDS UNDER CULTIVATION.

Extracted from "The African World," August 19th, 1911.

"The industry of coco-nut planting in West Africa is one of vast commercial possibilities, as the coco-nut palm is indigenous to the Coast, and it would appear that planters and investors are awakening to the rich returns that are to be gained by its cultivation on a systematic basis. In 1909, the Agricultural Department of the Gold Coast Government reported that the natives were making extensive plantations of coco-nuts, and that in a number of cases the trees were receiving very careful attention; especially, was much greater interest being shown in the preparation of copra, the dried kernel of the coco-nut. While the kernels of the African oil palm yield only 50 per cent. oil, copra produces at least 65 per cent., and it is only the prodigality of Nature that has prevented the coco-nut from receiving the recognition it deserves. The natives by whom the planting is principally carried on, find the labour entailed in collecting palm-oil or rubber less exacting and the remuneration greater, and it is on this account that the coco-nut industry has up to now failed to show any considerable progress. On the low-lying coastline of Sierra Leone, along the French Ivory Coast, at the mouth of the Volta River, and on the salt marshes at the delta of the Niger, coco-nut palms flourish and reach perfection. The plantations are for the most part under native ownership, and the produce is allowed through neglect to go to waste. Originally planted under the guidance of missionaries, the trees under the present owners receive little practical attention, and the nuts fall to the ground and rot, for lack of commercial enterprise. The agricultural departments of the various governments are using their best endeavours to interest the native in a systematic cultivation, and owing to the enhanced values obtained by the produce of the coco-nut trees efforts are being made by European firms themselves to nurse the industry. Owing to the rise in the price of copra, as mentioned in previous issues of the "African World," Messrs. Lever Bros., of Sunlight Soap fame, have commenced planting coco-nuts on the West Coast on their own account and on an extensive scale, and it is estimated that in about six years' time their plantations will be yielding many millions of coco-nuts per annum.

"There is hardly a part of the coco-nut that cannot be turned to profit. The principal product is copra, which is extracted from the kernel. This product yields an oil which enters very largely into the manufacture of soap. The oil is also used in the preparation of vegetable butter for cooking, and owing to the increasing scarcity of animal fats the demand is a very large and growing one. Another product used by confectioners is known as dessicated coco-nut, and is extracted from the white of the nut. Even the residue or cake left after the extraction of the oil is made up into a nutritious cattle food. The soap-making and vegetable butter trades are undoubtedly the most important consumers of coco-nut products. If any inference is to be drawn, it is surely this, that with the increase of population and the advance of civilization there will always be a growing demand for copra. The fact that the price has risen from £17 in April, 1909, to as high as £26 in April last year, indicates the increase in the demand; whilst it must be remembered that into Marseilles, the great centre for nut oils, there was an increase of 25,000 tons in the year 1910 over 1909. The husk of the coco-nut is also a source of considerable profit to the planter, the underlying fibres of which, when decorticated and cleaned,

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Copyright Photo] [*Underwood & Underwood*

A PALM GROVE LEADING TO A RESIDENCE.

become coir-fibre, from which mats, rugs and brushes are manufactured. Even the refuse that remains over can be put to use; it makes an excellent fuel, giving out a great heat, and an oven has been invented in which it can be employed most economically. The price of coir-fibre in Liverpool is from £16 10s. to £18 10s. per ton, according to quality. Twelve thousand coco-nut husks yield one ton of coir-fibre. There is a practically unlimited demand for coir-fibre. Four thousand large nuts, 7500 medium-sized nuts, or 10,000 small nuts, go to the ton of copra. The yearly average yield of nuts per tree at maturity is from forty to fifty, and if extra care were taken in cultivation and manuring, yields of seventy to a hundred per annum would not be at all extraordinary. There is a plentiful supply of inexpensive labour along the coast. The cost of cultivation and of harvesting is small, and there remains a fair margin of profit.

"Native methods of collecting the produce are very primitive, and co-operation is required to aid the delivery at port, and the exportation of the various products the coco-nut tree yields. The introduction of up-to-date machinery for decorticating the fibre, cracking the nuts, extracting the oils and twisting the yarn will add to the development of the industry on the coast.

"West Africa is three weeks journey nearer to the European markets than the Middle East, which supplies the major part of the world's output. This factor is an important one from many points of view—firstly, there is a saving of over 30/- per ton in carriage—in itself an item of importance; secondly, the journey being shorter, the produce arrives in a fresher condition, and, therefore, fetches a better price in the market. From the foregoing remarks it will be gathered that the industry offers many opportunities for the lucrative employment of capital, and as there are many millions of coco-nut trees on the West Coast in full bearing, it only requires a little enterprise and organization to develop an industry that is already proving exceedingly remunerative in other parts of the world."

"NUTS AND MILK."

A BLEND OF THE WEST OF ENGLAND AND TROPICS.

Who is not familiar with the story of the Coco-nut and its marvellous place in meeting the wants of people of colour? Do you not remember how it furnished him with food and milk, its fibre with material for his house, its leaves with his clothing, and its timber enabled him to paddle his own canoe?

Such was the old story of the traveller, but truth is still stranger than fiction. Who would have thought a few years ago that by a blend of the palm tree and a Dorset dairy we should manufacture one of the staple foods of Great Britain? Yet such is the case. The other day I inspected the marvel and mystery of the process. It took me some three or four hours to grasp its magnitude.

FIRST OF ALL

one has to realise that three trainloads a day of milk are conveyed from Somerset, Devon and Dorset to the gigantic factory near London, where so much of the celebrated Maypole Margarine is made. So after the arrival of the train I inspected the system by which the churns are unloaded and the milk is weighed—the careful way in which every churn is afterwards cleaned and brushed by steam—then journeyed to the top of the building to which the milk is pumped. I saw it passed over coolers containing refrigerating brine, and from these conducted to half-a-dozen refrigerating tanks, each of which contains something like 1600 gallons. Then came the pasteurising and the slight touch of souring and acidity necessary in Butter manufactory. There was, indeed, a note of the nursery here, for at this last stage its mixing and preparation is thoroughly accomplished by gigantic cradles.

COCO-NUT PALMS—WEST AFRICA.

THE ARRIVAL OF THE COCO-NUT.

The Coco-nut used in commerce does not make its appearance in the form familiar to those who indulge in Aunt Sally. It is a much more ponderous business. In some far-off tropical factories the Coco-nuts are collected, opened, and their fruit refined. This is then shipped to England in barrels containing some 300 lb. or 400 lb. each. I saw one building alone which contained about 30,000 such casks, which will give some idea of the magnificent scale upon which this great natural product of Africa and the Tropics does its part in feeding the English people. These casks are hoisted to the top floor of an immense structure, where they are opened by well-armed workmen, and their contents are split into small compass by chopping. The pure white flakes are most attractive, and I recalled my youth by enjoying a chunk. The Coco-nut thus passes to the room below, where it is melted in immense tanks kept constantly stirred. It is scarcely necessary for me to moralise on the immense nutritive value of the Coco-nut. Every scientist will tell you that in some form or another it is one of the most valuable food elements which human nature can thrive upon. The sterilised milk and coco-nut oil are then blended, different qualities for food being secured by slight variation in the mixture.

IT WAS AN OLD PREJUDICE

under which Margarine suffered years ago—owing, no doubt, to the belief that it was made from various obnoxious animal fats. As a matter of fact, there is at the present day no truth whatever in any such libel, no animal fat whatever is used in the production of Maypole Nut Margarine.

Every process of manufacture is spotlessly clean, and no dairy in the world could be more ideal in its equipment, no more rigorous cleanliness could anywhere be employed than in this immense and busy hive connected with the Maypole Dairy Co., which I am describing.

In its liquid form the mixture of milk and coco-nut is now conducted to immense revolving drums some 6ft. in diameter, which are kept at freezing point by interior refrigeration. This system of cooling is the special property of the Maypole system of production, and no part of the factory is more picturesque than the scene in the room below, where on every side immense flakes in crystallised form of beautiful primrose hue are descending.

As yet, however, the product is much too lacking in solidity, and is accordingly transferred to other revolving drums and subjected to another process, the effect of which brings it out ready for blending. It is then further pressed by being passed over three sets of rollers, at the first of which a slight touch of salt is added.

An adaptation of

THE BAKER'S KNEADING MACHINE

is the next stage of manufacture, where two mixers bring it to the necessary consistency. British-made Maypole Margarine is, in fact, superior to butter in its keeping qualities, and should be good for about a month ; not that there is any necessity for this test as at each one of the 690 Maypole Branches the stock is renewed at intervals of three days only. So rapid also is the process of manufacture that the milk which arrived on my first experience would have been taken away in the finished form a few hours later.

PACKING THE MAYPOLE.

This alone is a most interesting branch of the manufactory, and employs many busy hands. The case making is a triumph of rapidity. A case carrying some 56lb. being put together with one machine driving twenty nails in three seconds, whilst endless printing machinery is equally busy in attaching the familiar green label which marks each case.

THE WATER SUPPLY OF THE FACTORY

is also an important feature, there being some forty wells already in existence, while another large Artesian well going below the chalk is nearing completion. The engine room is one of the finest to be seen in any part of the country, there being one pair of engines alone of 900-h p.

SCIENTIFIC TESTS.

At every stage of its manufacture, British-made Maypole Margarine is subjected to severe scientific tests. Two staffs of chemists watch every process, either day or night, both of the raw materials and the finished manufacture ; it being fully realised that the safety of the public and prosperity of the undertaking depend upon the most rigorous safeguards in this respect. The Laboratory is worthy of any University, and it will be highly conducive to the public health if all food products could be subjected to similar tests.

The industry employs about 1000 hands—all British labour, by the way—and the total production of Margarine is about 1000 tons, or, in other words, over two and a quarter million pounds, per week.

A similar factory in Cheshire caters for the immense business done by the same company in the north of England, Scotland and Ireland. As an indication of the immense growth of the industry in this country, it is satisfactory to record that our imports from abroad have declined 30 per cent. since last year. This is largely owing to the growth of Maypole Nut Margarine in public favour, and as its value as an agreeable and nourishing food product becomes more widely known it is certain to increase even more rapidly. . . . .—*Extracts "Daily Mirror," 8th April*, 1911.

COCO-NUT PALMS—WEST AFRICA.

PALM-OIL TREE.

ANOTHER tree of commercial importance equal to that of the Coco-nut is the Palm Tree, particularly the species botanically known as the Elais Guineenis. It is to be found in enormous quantities on the West Coast of Africa, being indigenous, and is said to be most prolific in the area extending from the Cameroons to the extreme West Coast, including Northern and Southern Nigeria, the Gold Coast, the Ivory Coast, and Sierra Leone. The same or a similar species is, however, to be found in other tropical countries, and in many places the growth is being encouraged and plantations formed.

STAPLE TRADE.

From time immemorial the Palm-oil Tree has supplied the natives of the vast forests of West Africa "with most of the necessaries of their simple life, and for many generations has produced the staple articles of their trade with the white man, whose demand for palm-oil and palm-kernels has long been insatiable, but never more so than the present time. . . . The demand for these two products on the European markets has grown clamorous, and is constantly increasing in urgency."

"To the mind of an old traveller," says Mr. T. J. Alldridge, in his lecture on Sierra Leone to the members of the Royal Colonial Institute, in March, 1911, "who has penetrated a good way into the great oil palm belts, and who knows what these existing conditions really are, and who has also a fair idea of how these oil-palm products are turned to account in Europe, a very curious state of things presents itself. Up in the Hinterland of our Colony he sees a practically limitless supply of two commodities of which the industrial world can never get enough, and which it is using up rapidly in an increasing number of ways by the quickest and most scientific methods at present known; while the Hinterland natives are trying in vain to keep up the supply by expressing the oil and by cracking the nuts in the same primitive ways their earliest ancestors employed. . . . It is my strong personal belief, based, I may add, on a very wide experience, that the vast natural wealth of the Hinterland remains up to the present comparatively untouched. The extraordinary increase in the revenue of Sierra Leone during the past few years fills one who knows the circumstances of the Colony with amazement. It could never have been achieved had communication by railway into the oil-palm belts—formerly quite unworked—not been introduced by the Government. The results have been, as I have just said, extraordinary, although as yet hardly more than the fringe of these rich forests has been reached.

EXPANDING TRADE.

"Commercial activity has been aroused; no one who has seen the heavily-laden trucks of nature-produce awaiting the trains at each up-country station along the line, can question that; and this nature-produce, seen on its way to the coast for exportation, is to pay for the greatly-increased quantity of importations which the same railway is always bringing into these remote regions."

NO SPECIAL CULTIVATION.

As in the case of the Coco-nut, the Palm-oil Tree requires no special cultivation, where the soil and climatic conditions are suitable; all that is required is to create a nursery and transplant the young growth, giving each tree sufficient room in which to thrive and mature to perfection. In West Africa, the Palm-oil Tree is to be found in incalculable quantities. From Sierra Leone to Loango, oil-palms form vast forests. Brazil, the West Indies, the Canary Islands, and other districts, also produce the products of this tree. A cultivated plantation or farm is, generally speaking, made simply by clearing other growth and keeping the trees clear and free. It will thrive in almost any soil where the climatic conditions are suitable, but succeeds best in the rich soil generally associated with tropical vegetation, which is well drained. Moisture is important. Where the rainfall is below 50 inches it does not thrive, but it thrives where the rainfall exceeds 50 and heavier rainfalls do not either improve or adversely affect its growth. One authority asserts that no less than one-third of South Nigeria is suitable for the cultivation of Palm-oil Trees and that no efforts are made to plant systematically, except that in some farm lands the seeds are scattered just before the rainy season.

"The value, extent, and importance of the Palm-oil industry," says "The Times," "are but faintly realized by all except those who are actually engaged in the business."

HEIGHT AND MEANS OF COLLECTING.

The tree grows to upwards of 30 feet and, as in the case of the Coco-nut, its branches and fruit are at its summit and require skilful care in plucking, which the natives have become very expert in, climbing up the tree trunks with great ease, and cutting down the cones with sharp knives or cutlasses.

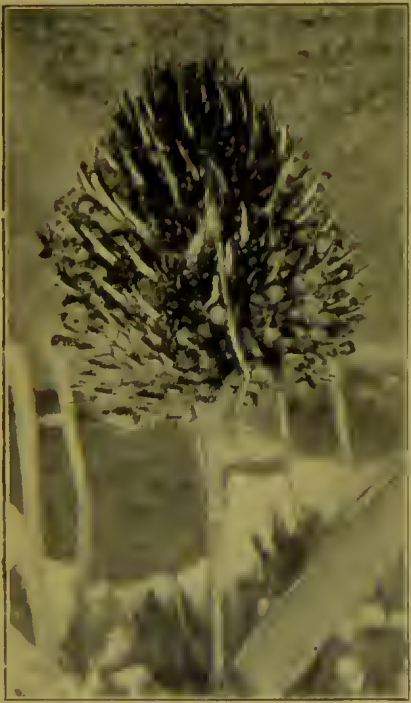
BEARING TERM—CONES.

The palms commence to flower in their fourth or fifth year, but sometimes in their third year—at first the male inflorescence and two years later the female. One authority states that in rich alluvial lands the fruit appears in the fifth year and in the sixth or seventh year in hilly country.

The tree bears annually from six to twelve spiky cones, round which the fruit appears. During the first year of bearing the tree produces two or three cones, increasing year by year to six cones, and from the 12th year a full harvest is obtained. The fruit is detached from these cones and yields not only what is known as palm oil, but also palm-kernel oil. The tree commences to bear after four years, but reaches maturity at seven or eight years, and thereafter produces fruit for an indefinite period, estimated from 60 to 100 years. The production is at present almost entirely in the hands of natives, the men generally gathering the fruit and the women and children expressing the oil.

THE FRUIT.

From a glance at the accompanying illustration it will be observed that the spiky exterior of the cone protects a very considerable number of small fruit about the size of a small plum. The fruit takes from two to six months to mature. It may thus be briefly described: (1) exterior fibrous shell, under which is (2) a pink oleagineous substance, in the centre of which is (3) an inner shell, or nut, containing the kernel, the shell of the kernel being about the thickness of cartridge paper. The cones vary in size, as also the size and quantity of fruit they bear, according to the age of the tree. In some years when the climatic conditions are specially favourable, the cone grows to an enormous size, a single cone weighing upwards of 56lbs. and containing 1000 to 1500 kernel nuts, all serviceable. The number of serviceable kernel nuts of a cone is frequently greater than the supply of serviceable pericarp, owing to some of the fruit on the cone being less developed, or the natives plucking before maturity.



An oil-palm cone weighing 56 lbs. This particular cone contained 1445 oil nuts.

PALM OIL.

What is commercially known as palm oil is obtained from the pericarp or outer covering of the fruit, which yields over 60 per cent. of its weight in oil (some authorities mention 65 per cent. to 72 per cent.), and as this outer covering weighs about 40 per cent. of the whole fruit, the palm oil existing therein represents over 24 per cent. of the whole weight of the fruit. The oil varies in colour, possessing at first a bright orange yellow colour, but exposure to the air eventually turns it to a dull white, or in some cases to a dull red.

CONSISTENCY.

It will be as well, perhaps, to remark that whilst these vegetable products are termed oils, they are liquid only in the tropics when refined, and their consistency on arrival in Europe varies from that of butter (Lagos oil) to that of hard tallow (Congo oil). The principal constituents of palm oil are glycerides of palmitin and olein and free palmitic acid.

METHOD OF RECOVERY.

The methods employed by the natives for the recovery of the oil from the cone are very crude. What they have to deal with are (a) the pericarp, or outer covering to an interior shell; (b) the interior nut or kernel. These methods we will proceed to deal with in turn.

OBTAINING PALM OIL.

The first process is to separate the pericarp or outer covering, consisting of a fibrous shell and oleagineous substance, from the interior nut. The fruit is exposed to the sun's rays for a few days and then stacked into heaps covered by leaves for a few days more for the purpose of fermentation, after which the oily covering is disintegrated from the shell or inner nut by being placed in wooden mortars and bruised and pounded with wooden pestles. The mass (except the internal kernel nut which is laid aside for the time being) is then turned into a receptacle, usually a small dug-out canoe partially filled with water, and kneaded between the hands of the workers, when the oil floats to the surface. This is skimmed off and after it has been boiled forms what in commerce is termed palm oil.

> The method of recovery probably varies in different districts.
>
> Another authority describes another native method of recovery, which consists of storing the fruit in holes in the ground until decomposition takes place, when the pulp becomes softened and the oil rises to the surface, or they bruise it with wooden pestles and finally, after separating the interior nut, boil it.
>
> Another authority states that the pericarp is boiled to a pulp with water, pressed by treading when cool, the oil rising to the surface, when it is pressed through sieves to remove impurities.
>
> Yet another states as follows:
>
> "After the bunches are cut they are conveyed to the preparing pit. The men cut up the bunches with cutlasses in order to assist the work of picking out the fruit, which is chiefly done by women and children.
>
> "The nuts, after being picked out, are thrown into a shallow pit (a hole from two to three feet deep) lined with shallow stones and plastered with a compound of palm oil and ashes (the latter prepared by burning plantain leaves) sprinkled with water, covered with plantain leaves and left for about five days. This causes a slight fermentation, which opens the fleshy coat of the fruit.
>
> "Then the nuts and pulp are laid on a wooden framework and left for another five days.
>
> "During this time a quantity of oil is realised, and drains down into the plastered hole. This oil is put into old kesorene tins ready for sale.
>
> "The nuts are then picked from the fibre and placed to dry.
>
> "The fibre is boiled in water in large iron pots till the whole rises.
>
> "This is the native way—wasteful and primitive."

The product is generally packed into receptacles such as calabashes or kerosene oil tins of convenient size for "head" transport, which, in most of the palm bearing districts, is the only means of carriage. Most of the oil is known or branded by the name of its place of origin. There are quite a number of brands among them, Lagos, Calabar, Congo, Loando, Saltpond, Niger, Benin, Bonny, etc.

THE PALM KERNEL.

The interior or kernel nuts of the fruit are first separated or picked out from the pericarp as already explained, and piled up or stored away to await a convenient time to be converted into what are known as palm kernels, and, being protected by a hard shell, these nuts do not deteriorate by keeping.

PALM-KERNEL NUTS AND THE KERNELS EXTRACTED THEREFROM.

(The exported kernels extracted from these nuts are shown white in the illustration.)

> "Piled in the open or the so-called verandahs of mud houses and sheds you will see large palm-cane receptacles, locally known as 'Binkies,' full of unbroken palm nuts, all waiting—perhaps for a couple of years— . . . They wait and the market waits too. Their turn comes at last. The women and children break them between a couple of stones. . . . . . As you watch it the marvel is that the total output is as large as it is. In the forests, so illimitable appears the quantity of oil palms that you wonder how all the fruit can be gathered. The native will tell you, however, that this is impossible, and that great quantities of trees have to remain untouched. So much for the primitive methods still at work—methods invented long before the native found out 'that time is money,' a fact that he is slowly but surely beginning to realise."

During the period of the year when the cones of fruit cannot be gathered, the women and children break the kernel nuts between a couple of stones. (See Illustration p. 94). This is all the treatment they generally receive prior to exportation to Europe, where almost exclusively the oil is extracted from the inside or kernel by expression or extraction with solvents, yielding approximately half their weight, and they are commercially known as palm kernels.

Mendi women breaking palm-nuts by hand between two stones.

This oil is sometimes termed "Copra oil." Germany is the chief importer of palm kernels, taking about 85 per cent. of the total exports. "German brains have evidently found out many uses for our palm kernels unknown in other countries, and doubtless will speedily find out many more."

> The nuts are set aside for later treatment, as it is necessary to deal with the pericarp almost as gathered, and since the fruit can be economically gathered only for seven months in the year, during that period labour is concentrated on gathering and extracting, first the oil from the pericarp, leaving the nuts, which will keep any length of time, to be dealt with during period when the fruit cannot be gathered.

By the primitive methods generally adopted by the natives, only about one-third of the oil is extracted. German, English and other engineers, however, have given attention to the construction of machinery for the industry and as a result there have been introduced

A Chief standing by piles of unbroken palm-nuts.

several machines* both for shelling the nuts and extracting the oil. And, as a result of this, ere long there will doubtless be established, adjacent to the plantations, many factories equipped with modern machines capable of outputs of 100 tons of oil per week and extracting 89 per cent. of the palm oil from the pericarp, as against 30 to 40 per cent. by present primitive native methods, and the kernel oil will also be extracted on the spot instead of the kernels being exported and treated, as has been the practice up to now, almost exclusively in Europe.

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* The best known machine at present appears to be the Haake machine—the invention of a German firm of that name.

USES.

Palm oil and palm kernel oil are now used commercially for a great variety of purposes. They enter into the manufacture of some margarines, or other substitutes for butter. Considerable quantities are utilized in soap manufacture, candle making, as substitutes for Coco-nut oil, as lubricants, and an enormous amount is consumed by all the railway companies of the world, who use them exclusively for greasing the axle boxes of railway carriages. They are also used for cooking purposes, in the making of cattle food cake, and, in the locality of their origin, as butter. In fact, in their refined or unrefined form, their uses may be said to be almost innumerable.

IMPORTS.

The demand for the product is almost unlimited and accurate data as to the world's production of palm oil is unfortunately unobtainable. The value of the industry, however, may be gauged from the following incomplete table of trade

PALM OIL PRODUCTS.

IMPORTS INTO GREAT BRITAIN.

Refined and Unrefined Palm Oil.		
Year.	Quantity. Cwts.	Value. £
1906 ...	1,285,471	1,531,812
1909 ...	1,821,286	2,281,588
1910 ...	2,055,160	3,168,414

COUNTRIES FROM WHENCE IMPORTED.

Refined and Unrefined.

Year 1910.

Countries.	Quantities. Cwts.	Value. £
Germany	389,479	629,766
German West Africa...	30,749	48,583
French West Africa	20,323	29,924
Portuguese West Africa	8,185	13,016
Liberia	10,187	14,743
Spanish West Africa	386	580
Congo Free State	3,978	6,126
Other Foreign Countries	18,492	31,456
Sierra Leone	43,159	64,410
Gold Coast	125,887	188,754
The Colony and Protectorate of Southern Nigeria ... Protectorate of Northern Nigeria	1,404,233	2,140,894
Other British Possessions	102	174
Total for 1910	**2,055,160**	**£3,168,414**
Total from Foreign Countries	481,779	£774,182
Do. British Possessions	1,573,381	£2,394,232
Cwts.	**2,055,160**	**£3,168,414**

EXPORTS.

Refined and Unrefined.

(Countries to whom Exported.)

Year 1910.

	Quantity. Cwts.	Value. £
Russia	75,691	115,170
Sweden	15,348	23,645
Germany	71,165	110,134
Netherlands	211,821	318,499
Belgium	164,433	252,357
France	10,208	16,102
Italy	128,721	193,917
Portugal	5,783	8,773
United States of America	542,020	821,534
Argentine Republic	12,330	18,721
Other Foreign Countries	18,904	30,103
To British Possessions	10,590	19,902
Total Exports ... ... Cwts.	**1,267,014**	**£1,928,857**

PALM OIL AND PALM KERNELS.

Germany, France, Holland, Belgium and the United States (as remarked previously under the heading Copra) have a more complete method of compiling their statistics than Great Britain, therefore whilst we have been able to give information regarding the imports of Palm Oil, it is not possible to obtain statistics of the imports of Palm Kernels, although an important industry. They are included in the British Blue Book returns under "Nuts and kernels for expressing oil therefrom," the total imports of which, rose from £894,836 in 1906 to £1,915,279 in 1910, and the Palm Kernel industry is one of our best West African colonial industries ! !

GERMAN IMPORTS.

	Palm Oil.	Palm Kernels.	Palm Kernel Oil.	Totals.	
	£	£	£	£	
1908	189,850	2,307,300	1,600	2,498,750	1908.
1910	**420,650**	**4,420,350**	**1,900**	**4,842,900**	**1910.**

FRENCH IMPORTS.

	Palm Oil.	Palm Kernels.	Palm Kernel Oil.	Totals.	
	£	£		£	
1908	439,920	40,480	—	480,400	1908.
1910	**405,440**	**21,880**	—	**427,320**	**1910.**

HOLLAND.

	Palm Oil.	Palm Kernels.	Palm Kernel Oil.	Totals.	
	£	£		£	
1908	893,533	385,482	—	1,279,015	1908.
1910	**922,371**	**425,919**	—	**1,348,290**	**1910.**

BELGIUM.

	Palm Oil.	Palm Kernels.	Palm Kernel Oil.	Totals.	
	£	£		£	
1908	279,494	6,766	—	286,260	1908.
1910	**439,396**	**125,105**	—	**564,501**	**1910.**

UNITED STATES.

	Palm Oil.	Palm Kernels.	Palm Kernel Oil.	Totals.	
	£			£	
1908	369,922	—	—	369,922	1908.
1910	**1,118,107**	—	—	**1,118,107**	**1910.**

Where Palm Kernel Oil or Palm Kernels are left blank, the countries either do not import them or there is no method of arriving at them.

Enormous Growth of Trade.

SUMMARY FIGURES.

PALM OIL, PALM KERNELS, AND PALM KERNEL OIL.

FIGURES OF SIX COUNTRIES.

	1908.	1910.
GREAT BRITAIN[*1] (Palm Oil only.) ...	1,531,812	**3,168,414.**
GERMANY	2,498,750	**4,842,900.**
FRANCE...	480,400	**427,320.**
HOLLAND	1 279,015	**1,348,290.**
BELGIUM	286,260	**564,501.**
UNITED STATES	369,922	**1,118,107.**
	£6,446,159	**£11,469,532.**

TOTAL IMPORTS	**1908**	**£6,446,159.**
,, ,, ...	**1910**	**£11,469,532.**

[*1] Figures for Great Britain of Palm Oil only. Palm Kernels cannot be ascertained, although an important business. The figures in this case only are for 1906 and 1910.

PALM OIL, PALM KERNELS, PALM KERNEL OIL, COPRA, AND COCO-NUT OIL.

IMPORTS OF SIX COUNTRIES.

1908	**£15,561,882.**
1910	**£26,863,150.**

We doubt if the figures (as the case of Coco-nut oil imports) represent the true amount of even Britain's palm oil trade, as great quantities of Stearine are imported both from foreign countries and British possessions, in the manufacture of which doubtless increasing quantities of palm oil and other vegetable fats are being used. Then, again, we import very large quantities of nuts and kernels, the description of which is not detailed in the Board of Trade returns except as "for expressing oil therefrom," in which Coco-nuts and Palm kernels are included. Vast quantities of the products of the Palm and Coco-nut tree are imported by France, Germany, Holland and other countries, not only from British possessions but also foreign tropical possessions, so that the industry must, even to-day, be of enormous commercial importance—of an importance but faintly realised except by those already in the trade.

NET PROFITS 100 PER CENT.

"The normal price of Palm oil," says Mr. A. P. Chalkley, B.Sc. (Lond.) "may be taken as £30 per ton, which figure is, however, frequently exceeded, and the point immediately to be considered is the price at which the oil can be delivered in England and other European countries by extracting it on the spot with modern machinery. It is a question if the Palm oil alone should be extracted and the kernels sent home in bulk, or whether the kernel oil should also be obtained. Probably, since the machinery is available, it is a better proposition to extract both the palm and kernel oil on the spot, and also manufacture the meal from the refuse, and export all to Europe, the meal being quite a valuable product, and worth about £4 per ton. Reckoning on the latter course of procedure being adopted, it is estimated that the oil can be delivered to the buyer in Europe at the cost of £13 to £15 per ton, including all charges, leaving a net profit of something like £15 per ton; this estimate being on the basis of a moderate output per annum of 2000 tons. It is not difficult to understand that this estimate of cost of productions and delivery in Europe is a very conservative one, when it is remembered that an enormous and most profitable trade is now carried on in Palm oil and kernels in spite of the fact that the methods employed are very slow and relatively expensive.

COST OF COLLECTING.

"The cost of collecting the fruit from the trees is extremely small, owing to the cheapness of labour, and as the performance of machines can be guaranteed with safety, and the cost of transport to Europe is a known quantity, there is really very little in the nature of a speculation in the matter. . . .

YIELD PER ACRE.

"It is generally reckoned by authorities who have had long experience in the Palm oil industry that an acre of average palm-bearing land produces sufficient fruit to give a yield of about 12 cwt. of oil per annum, so that from an estate a square mile in extent, nearly 400 tons of Palm oil can be produced. . . ."

YIELD PER TREE.

Another source states that the yield from the pericarp is one gallon of oil per tree per annum, and gives the following estimate of cost and production and net profit based on only 25,000 trees:

SELLING VALUE IN LIVERPOOL.

	£	s.	d.
25,000 gallons of palm oil at 5s. 3d. per gallon ...	6,562	10	0
90 tons of palm kernels at £17 10s. per ton ...	1,575	0	0
Total value ...	£8,137	10	0

DEDUCT COST OF PRODUCTION, as follows:

	£	s.	d.			
Cost of peeling nuts	1,562	10	0			
Cost of expressing oil and fermenting	1,250	0	0			
Freight	170	0	0			
Insurance, etc.	17	0	0			
				2,999	10	0
Leaving an annual net profit from only 25,000 trees of				£5,138	0	0

MARKET PRICES.

The average market prices of palm tree products per ton for 1910 were (*vide* Government Report) as follows:

	Palm Oil per Ton. 1908. £	Palm Oil per Ton. 1910. £
January	26	30
February	23	28
March	21	30
April	21	32
May	21	31
June	21	28
July	22	29
August	22	30
September	22	33
October	23	34
November	22	35
December	22	35

	Palm Kernels per ton. 1908. £	Palm Kernels per ton. 1910. £
January	13	17
February	13	17
March	12	18
April	12	20
May	12	19
June	12	17
July	13	17
August	13	18
September	13	19
October	13	19
November	13	19
December	13	18

It will thus be seen that the average price of Palm Oil and Palm kernels for the years given were as follows:

Palm Oil. Average price per ton.	
1908.	1910.
£22	£31

Palm Kernels. Average price per ton.	
1908.	1910.
£13	£18

The market prices at the time of writing, October 1911, are as follows:

Palm Oil per ton.	Palm Kernel Oil.	Palm Kernels per ton.
£	£	£ s. d.
36	39	20 2 6

PALM AND PALM OIL KERNELS.

EXTRACTS FROM LATEST AVAILABLE GOVERNMENT REPORTS.

SIERRA LEONE.—Total exports, 1909, £981,466, of which palm kernels and palm oil contributed £546,887. "The action of the Government in extending tramways from the railway to grounds hitherto practically untouched (owing to the difficulty of transport, but which were rich in produce, notably the Yonni Country and Baïma) improved roads and means of transport, keenness of competition, and good prices obtainable, have all borne a part in stimulating the natives to sustained exertions in supplying the demand. . . . . The increased supply of kernels, like the increased supply of kola nuts, may be attributed mainly to the increased facilities for transport in the Protectorate, and to the wider dissemination of market prices, thereby engendering greater confidence between the natives and the trader. . . . . *Now that vegetable oils occupy such a prominent position in the commercial world, it is a matter for some surprise that the methods of extraction of the oil from the pericarp of the nut, and from the kernel itself, are so primitive.* . . . . The demand for palm oil is regular and consistent. The manufacture of soap and candles will always provide a ready market for a great proportion of the oil produced. Large quantities are also used in the tin plate industry, where the heated iron plates are covered with palm oil to prevent oxidisation before they are dipped into the molten tin. . . . . Palm oil, again, is a staple food throughout the Colony and Protectorate. Its domestic uses are many, and it is impossible to estimate, even approximately, the quantity which is used in home consumption. . . . . Germany easily maintains her position as chief importer of palm kernels, having taken 85·7 per cent. of the total quantity exported during the year."

SIERRA LEONE.—(Report issued in July, 1911, of trade of year 1910). "**Palm Kernels.**—The statistics of the exports of Palm Kernels, the foremost item of our domestic produce yielding good profits to seller and exporter alike, attained proportions during 1910 never yet reached during the history of the Colony. The weight exported was 43,031 tons, valued at £644,684. . . . . The primary cause of the increase in output is undoubtedly due to the phenomenally good prices ruling in the European Markets throughout the year 1910. . . . .

"To fully appreciate the enormous benefit to the Palm Kernel industry, owing to the penetration of the iron horse among the rich palm-bearing lands of the Protectorate jungle, greatly assisted by a system of roads which act as feeders to the railway . . . . it is necessary to study the figures . . . . from the time when the operations of the Government Railway were directed to those areas." . . . .

Value of Palm Kernels exported from Sierra Leone :

1908.	1909.	1910.
£	£	£
332,887	482,614	644,684

. . . . "And even if the crop were short in one part all the native has to do is to go a little further in, where he can find more than he is able to gather." . . . . It is no exaggeration to say that there is limitless scope for the extension of the industry. . . . . The main problem . . . . is labour, and this hinges on transport. . . . . So satisfactory and profitable an undertaking the Yonni Branch line has already proved, and so sanguine is the forecast of its increasing earnings, that authority has been obtained to proceed with a further extension of the Boia-Yonni Branch line to a point 50 miles from its present terminus."

SOUTHERN NIGERIA.—"Although the value of cultivated crops (cotton, cocoa and maize) exported during 1909 was almost double that of 1906, palm oil and kernels contributed practically nine-tenths of the Southern Nigeria produce shipped during the year under review.

"The following table shows the quantity and value of oil and kernel exports for the last 10 years:

PALM OIL.

Year.	Gallons.	£	
1900	12,761,585	681,296	Porto Novo transit lots included up to 1904.
1901	15,894,404	813,478	
1902	17,966,857	957,637	
1903	15,192,135	847,954	
1904	16,225,175	929,170	
1905	14,157,384	857,848	
1906	16,032,571	1,001,648	
1907	18,332,531	1,313,960	
1908	18,328,896	1,154,933	
1909	22,996,487	1,447,163	

PALM KERNELS.

Year.	Tons.	£	
1900	85,624	833,630	Porto Novo transit lots included up to 1904.
1901	114,046	948,010	
1902	132,556	1,274,487	
1903	131,898	1,094,349	
1904	139,788	1,278,394	
1905	108,817	1,090,054	
1906	113,347	1,193,939	
1907	133,630	1,658,292	
1908	136,558	1,424,595	
1909	158,849	1,815,967	

Excluding specie and foreign goods, 85 per cent. of the Exports of Southern Nigeria consist of the produce of the palm tree."

NORTHERN NIGERIA.—Exports, palm kernels, 1909, £41,750. "Local internal trade is prospering, and general appearance of well-being amongst natives is most noticeable. Under peaceful conditions, increased areas are being brought under cultivation. . . . . The introduction of the railway has been of benefit . . . . as it has brought tribes, formerly hostile and suspicious of each other, to work amicably side by side ; it has shown them the advantages of organised labour, fostered trade, and distributed a large amount of money in the outlying districts, where silver was formerly very scarce. . . . . An intensive cultivation is extensively practised in the Northern Provinces, and an increase in the exports of produce is hoped for when transport by rail has been established."

GAMBIA.—Exports, palm kernels, 1910, 467 tons, value £5640, against 1909, 389 tons, value £3526. "A large trade is done by the re-exportation of kolas from this Colony to adjacent French territories."

GOLD COAST.—Exports palm kernels, 1910, 14,182 tons, value £185,058; palm oil, 2,044,868 gallons, value £161,388. Respective increase in value over 1909, £72,633, £40,410. The exports for 1909 being: palm kernels 11,598 tons, value £112,425; palm oil, 2,007,296 gallons, value £120,978. "Speaking generally, there have been signs of increased prosperity among the natives, owing principally to the development of agriculture and other economic products. A welcome change is taking place in the attitude of the people towards cultivation of the soil, and the close of the year sees many chiefs and educated natives engaged in agricultural pursuits. . . . Substantial progress has been made with the construction of railways. . . ." Total train mileage, exclusive of banking and shunting: 1909, 127,973 miles; 1910, 157,467 miles—increase 29,494 miles.

SPECIES OF FRUIT WHICH YIELDS VEGETABLE OILS AND FATS.

"The more valuable [vegetable oil] plants from the rain or moist tropical evergreen forests of the Gold Coast and Ashanti are arranged below:

The OIL-PALM (Elais Guineenis).
AWAMA (Ricinodendron Africanus).
ALHAWAH (Pentaclethra macrophylla).
BAKU (Mimusops djave).
CARAPA GUIANENSIS.
IRVINGIA BARTERI.
PENTADESMA BUTARACEA.

From the above list it will be seen that this type of forest is very rich in oil-yielding species."*

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* Colonial Report on Forests, by H. N. Thompson, Conservator.

NOTE.—Further information regarding vegetable-oil products produced from tropical districts controlled by Britain, and information relative to the vegetable oil products produced by countries not controlled by Britain, including South America and tropical districts controlled by France, Germany, Belgium, United States, etc., is in course of collection and preparation, for which purpose several hundreds of correspondents residing in various parts of the tropics have been communicated with and we are adding to our store of information by almost every incoming mail.

MISCELLANEOUS.

ANIMAL OILS.

Animal oils include butter, lard, tallow, horse-grease, neatsfoot oil, bone oil, neutral lard and oleo oil, also oils of whales, seals, porpoises, walrus, and fish such as cod, shark, pilchard, herring, etc. There are also liver oils. Animal fats include those obtained from the ox, sheep, hog, goat and goose.

VEGETABLE OILS.

Vegetable oils are such as those obtained from Coco-nut, Oil-palm, Oil-palm kernel, Olive, Cotton-seed, Linseed, Rapeseed, Poppy, Colza, Ground-nut, Sesamum, Castor, Ravison, Chinese-wood, Sunflower, Soya, Maize, and Walnut. Bassia, nutmeg, carapa and cocoa also yield a thick oily substance approaching butter consistency.

OTHER OIL NUTS.

There are many other nuts from which vegetable oil is or can be produced for commercial purposes; want of space, however, precludes us dealing with them in the present instance.

KOLA NUT.

It will possibly be of interest briefly to refer to the Kola Nut, which, although used for quite a different purpose is a product of rising commercial importance and has great possibilities. It grows in abundance in West Africa, and is so highly prized by the natives, who desire to obtain as large a crop as possible, that the kola tree has become a subject for fetish observances. They are extensively used as a tonic or stimulant. "One nut well masticated and eaten will sustain a man for a whole day without food. The nut has no intoxicating or reactionary effect, though it has a very bitter and astringent taste . . . . they are ground down, mixed with honey and seasoned with ginger, pepper or other condiment, and used as an adjunct to ordinary food. The MANO, SALIJA and SULIMA parts of the Sherbro District are particularly rich in the kola nut, and when transport facilities are made easier in this district, a great impetus will, it is confidently anticipated, be given to the export trade in kola nuts, as well as other products of the soil."[1] A good tree crop is said to average £3 in value, and "there is no laborious work attached to the preparation; the nut when taken from the pod is simply peeled and washed, and then carefully packed into leaves within large baskets. . . . . Kolas are said to contain a large quantity of caffeine, and are consumed by the people of many tribes as a stimulant to induce wakefulness when desired and to keep off the pangs of hunger and thirst. . . . . Any new development company should not fail to include the extensive growing of kolas as a most profitable business, the trees bearing in about seven years. So much importance is attached to kola trees that they are handed down from father to son."[2]

"The expansion of the Kola nut industry during 1910 is both remarkable and surprising. . . . . Enterprise in this commodity during 1910 seemed to have spread in some measure beyond the control of traders resident in the Colony and Protectorate."[3]

[1] Government Report, Sierra Leone, for 1909. [2] T. J. Alldridge, Paper to Royal Colonial Institute, 1911.
[3] " " " " " 1910.

Exports from Sierra Leone as follows:

	Tons.	Value £
1905	769	75,728
1906	1,155	104,084
1907	1,374	113,674
1908	1,162	108,895
1909	1,321	153,919
1910	1,511	191,942

OILS.

Oils are classified according to their properties and uses, and are known as "Fixed," "Volatile," "Essential," "Drying," "Semi-Drying," "Non-Drying," and "Solid" or "Semi-Solid" fats.

FIXED OILS are such as do not evaporate; a drop placed on a piece of paper, for instance, leaves a permanent grease spot behind. Among fixed vegetable oils are coco-nut, palm oil, ground nut, linseed, rapeseed, etc.

VOLATILE OILS, being non-glyceritic, on the contrary, will evaporate completely. To this class belong most of the **Essential Oils** used for flavouring and in perfumery, such as the oils of hops, lemon, orange peel, almonds, aniseed, cinnamon, lavender, garlick, horse radish, etc., etc.

DRYING OILS are those which when exposed to the air in thin layers absorb oxygen from the atmosphere, and readily dry to a tough skin. Boiled linseed oil is the typical drying oil.

SEMI-DRYING OILS are such as are extracted from cottonseed, etc.

NON-DRYING OILS under the above conditions remain moist, either permanently or for a long time. Olive oil is a typical non-drier.

SOLID or SEMI-SOLID VEGETABLE FATS include coco-nut oil, palm oil, palm kernel oil, cacao butter, laurel, Macassar, Dilka, and Bassia Oils; nutmeg butter, cottonseed stearin, vegetable tallow, Goa butter, Mahwah butter, Malabar tallow, etc.

As pointed out elsewhere, although the products of the Coco-nut tree and the oil palm are termed oils, until subjected to various refining processes, they have, on arrival in Europe, the appearance and consistency of light-coloured butter, although in the countries of their origin when there extracted, owing to temperature, they are more soluble.

Whilst the world's demand for oils and fats is ever increasing, the rate of supply is, as already stated, not growing in proportion.

Regular supplies can only be relied upon by the cultivation of vegetable trees yielding **vegetable** fats.

The unreliability of supplies of animal fats (particularly those obtained from the ox, hog, sheep, goat, etc.) will probably be greatly evidenced in present supplies. The fact that Messrs. Lever Bros. are acquiring lands in tropical countries suitable for the cultivation of trees yielding vegetable oil products, is illustrative of the concern for supplies.

WEST AFRICAN PALM OIL.

MODERNIZING THE METHODS OF EXTRACTION.

Extracted from "The Times," September 4th, 1911.

"Up to within the most recent years the ignorance on matters connected with the West Coast of Africa has been widespread, and at the present moment the possibilities of the future development not only of our own Colonies and Protectorates, but of those of France and Germany, are unknown to all but a few, who are actively interesting themselves in some important questions whose solution will mean a vast increase in the prosperity of West Africa.

"**The value, extent, and importance of the palm oil industry** are but faintly realized by all except those who are actively engaged in the business. The amount of oil imported into Great Britain annually is now probably in the neighbourhood of 70,000 tons, while from Lagos alone the value of oil exported is between one and two millions sterling. The palm tree from which the palm fruit is obtained is indigenous and grows in enormous quantities on the West Coast of Africa, but it is most prolific from the Cameroons to the extreme West Coast, the area included embracing Northern and Southern Nigeria, the Gold Coast, the Ivory Coast, and Sierra Leone. The trees are 30ft. in height or more, and each bears anything up to seven or eight cones of fruit, and in fully matured trees the yield is often larger. As the cones are very high up, it is necessary to exercise some care in plucking them, and the natives have become very expert in this operation, climbing up the tall straight trunks of the trees with great ease, and cutting down the cones with sharp knives or cutlasses. The fruit is then detached from these cones. It consists of a soft outer covering or pericarp, which contains the palm oil, and inside this is the palm nut. This nut, when the hard covering shell is cracked and removed, yields the **kernel,** which **contains** usually about **50 per cent.** of **palm kernel oil**, which differs in its quality and applications from the palm oil, but is about equally as valuable. The **pericarp** usually holds about **60 per cent.** of its weight **of oil** or over, and as this pericarp is something approaching 40 per cent. of the whole fruit the amount of palm oil in the fruit is somewhere in the neighbourhood of 24 per cent.

OIL EXTRACTION BY MACHINERY.

"The methods for extracting the palm oil and separating the palm kernels for shipment to Europe have **hitherto been very crude and tedious.** By the means now generally adopted by the natives only about one-third of the available palm oil in the fruit is obtained, and as the nuts are usually cracked singly by the native women, it is evident that the cost of labour involved in the process, even though relatively cheap, is far higher than would be the case were more efficient methods available.

"The attention of engineers has been turned to this subject of the extraction of palm oil for some considerable time, chiefly perhaps in Germany, with the result that there are now on the market several machines capable of extracting the oil from the pericarp to within about 2 per cent. of the total quantity, which is equivalent to obtaining about 22 per cent. of palm oil from the palm fruit. These machines are capable of dealing with very large quantities, and it is probable that the next few years will see a large number of them set to work and many factories established in West Africa, not only for extracting the palm oil, but for shelling the nuts and obtaining the kernel oil, which has up to now been almost exclusively done in Europe. For many years hand nut-cracking machines have been in use in Nigeria and elsewhere, but these have been for operation on a small scale, and it is with much larger power-driven machines, capable of outputs of 100 tons of oil per week, that future developments may be expected. . . .

STORING.

"A very important point of which sight should not be lost in a consideration of a palm oil extraction plant is the fact that the palm fruit cannot economically be gathered all the year round, but only about seven months out of 12, varying slightly, however, in different districts. It is quite useless to store the freshly-gathered fruit, and in this way keep the machinery fully occupied, as it must be treated within a few days of being taken from the tree, otherwise the oil is of little value. The nuts can, however, be stored for almost any length of time, so that it is economical to keep the plant at work on the production of the palm oil during the whole of the gathering period, and house the nuts until no more fruit is available, when the same plant may be employed for the extraction of the palm oil, the nut-cracking machines then being the only portion of the plant which is not working continuously throughout the year.

"The only bar to the widespread development of the palm oil industry in West Africa at the present time is the difficulty of transport from some of the best palm districts, and this will not be overcome until much of the country is opened up, in which, however, steady progress is being made. But there are very large palm-bearing areas not far from the coast, and on the verge of wide navigable rivers, where the question of transporting the oil for shipment involves no great difficulty or expense, and it is in these districts that the first steps will be taken on a large scale. When it is remembered that the palm oil will fetch about £30 per ton in Europe at the present time, and that on a moderately large scale it could be delivered in Liverpool for under £15 per ton, including absolutely all charges, with guaranteed cost of production, it is not difficult to understand that future developments may be rapid, and have an important bearing on the general prospects of the West Coast."

THE CONGO OIL-PALM INDUSTRY.

Extracted from "The Oil and Colour Trades Journal," October 7th, 1911.

"The conditions of a concession granted by the Belgian Government to a British firm have just been published in the Official Gazette of the Colony. The concession provides that the British firm shall create a Belgian company, with a capital of £1,000,000, whose chief object will be the manufacture of vegetable oils, for which oil mills capable of pressing not less than 6000 tons of palm kernels per annum shall be set up in each of the concession areas within a year. These areas, which are leased for 33 years, are situated around Bumba and Barumbu on the main river, Lusanga on the Kwilu, a site 25 miles to the south of Igendi on the Ruki, and Basongo on the Kasai Rivers. The company is given ten years to select from the territories leased an area not exceeding 185,336 acres, but if on the expiration of that period the company's mills are able to work 15,000 tons of palm fruit per annum, the right of selection will be increased to 494,228 acres. Finally on January 1, 1945, the company will be declared proprietors of such lands as they may have chosen and held in lease in each of the areas specified to the extent of 98,946 acres in each area, with an aggregrate maximum of 350,671 acres. An additional privilege is granted the company to acquire further lands among the specified areas at the ratio of 4 hectares (9·8 acres) per ton of oil or its equivalent in oil-bearing produce, exported during the preceding five years, provided the land acquired does not exceed 432,447 acres. The company undertakes to pay 25c. (2½d.) per hectare (2·4 acres), and to export a minimum of 1 ton of oil per 25 hectares (61·8 acres) per annum. The company are also required to pay a wage of not less than 25c. (2½d.) a day of eight hours to each adult labourer, or if a system of piece-work is adopted, a corresponding scale of pay shall be made, while the Governor-General is empowered, if necessary, to cancel any contract with the workmen concluded for a period exceeding three months.

"While reserving to the native the privilege of gathering freely, on their own account, such produce as rubber, ivory and copal, on the company's lands, the lease confers upon the company the right of erecting houses, shops, mills and all buildings used by the company, of collecting, treating and exporting notably oleaginous products, of creating plantations, carrying out irrigation and other works, rearing cattle, poultry, &c., cutting wood for its own use, making roads, running steamers, building canals and railways, &c.

"An over-estimate can hardly be made of the benefits the natives will derive from the work the company's business will provide. The money so badly needed by the natives will be introduced into the country, much enlightenment will be spread by the creation of schools which the company will establish in each district, and the baneful influences of witch doctors will be combated by the medical staff of the hospitals that will also be opened in each concession area.

"Modern oil pressing plant will supersede the primitive native method of expressing the oil, which entails much manual labour. At present the palm nuts are stripped from the bunch and well boiled. After boiling they are put in a disused canoe and well trodden out. Water is gradually added until the oil becomes separated from the nuts; the fibre and the kernels sink, leaving the oil floating on the surface. The oil is then skimmed off and put into earthenware pots. After boiling again for a prolonged time it is ready for use. The kernel itself, which contains an oil of a higher grade than that produced, is thrown away without crushing or burned to prevent it from taking root in the cleared spaces in which it is worked. The output of oil is consequently insignificant, notwithstanding the fair price offered at Yumbi and other trading centres."

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Winchelsea.—"Am very much obliged to you for your valuable information sent me in letters and forms of this morning."

Winchelssa.—"I thank you very much for the interesting and satisfactory explanatory notes."

Swansea.—"I passed your name and address on to him with my strongest recommendation."

S. Wales.—"I thank you very much for your kindly interests on my behalf."

Etc., Etc.

Subscriptions date from day of Enrolment.

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